Cancer
in
South Dakota
2001

South Dakota Cancer Registry
Department of Health
September 2004

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PREFACE

"Cancer in South Dakota, 2001," is the tenth annual report from the South Dakota Cancer Registry (SDCR) in the South Dakota Department of Health (DOH). The report contains 2001 incidence and mortality data of South Dakota residents. Year 2001 is the reference year for the SDCR and also the first year that the data have achieved many of the national standards. The SDCR is situated jointly in the Office of Data, Statistics and Vital Records in the Division of Administration and in the Office of Health Promotion in the Division of Health and Medical Services.

Mynna Boodhoo Kightlinger, MSPH, Cancer Registry Coordinator prepared this report. Kay Darrington, Certified Tumor Registrar manages daily operations of the data and Mary Sarvis, Policy Analyst II prepared statistics and works with the database. Kathlene Mueller, Colleen Winter, Norma Schmidt and Barbara Buhler provided comments.

Acknowledgements

The 2001 cancer database is the result of collaboration among many sources: American College of Surgeons approved cancer centers, federal facilities, pathology laboratories, other South Dakota hospitals and other states where South Dakota residents are diagnosed and/or treated for cancer. South Dakota's mortality data comes from the Office of Data, Statistics and Vital Records in the DOH. The SDCR acknowledges and sincerely appreciates all cooperation.

Requests for Copies and Information

Please direct your request for additional copies to the following address:

<div align="center">

South Dakota Department of Health
600 East Capitol
Pierre, South Dakota 57501-2536
Phone: (605) 773-3361 or (605) 773-3737

</div>

Data queries, cancer concerns or information should be addressed to:

<div align="center">

Mynna Boodhoo Kightlinger
Cancer Registry Coordinator
615 East Fourth Street
Pierre, South Dakota 57501
Phone: (605) 773-5740

</div>

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Summary

This report summarizes the state of cancer in South Dakota and includes cancer incidence and mortality data. The data will enable the many organizations working with cancer prevention and control to identify public health problems, target goals for cancer control, and to inform citizens and health care professionals about risks, early detection, and treatment.

Incidence

- Approximately 3,500 South Dakotans were diagnosed with cancer in 2001, excluding the less life-threatening cancers such as *in situ* cancers and the common skin cancers.

- The top five cancer sites were prostate, female breast, lung and bronchus, colorectal and non-Hodgkin lymphoma, accounting for 63 percent of all cancer cases.

- More than half (54 percent) of all new cancers were diagnosed in males and 46 percent were in females.

- Whites accounted for 92 percent of all cancer cases, American Indians were 3 percent and other or unknown races were 5 percent.

Mortality

- Cancer was the second leading cause of death in South Dakota.

- Nearly 1,600 South Dakotans died of cancer in 2001 accounting for one in every four deaths.

- Cancers of the lung and bronchus, colorectal, prostate, pancreas and female breast were the five leading causes of cancer death among South Dakotans in 2001, accounting for 59 percent of all cancer deaths.

- Males accounted for 57 percent of deaths with lung and bronchus, colorectal, bladder, pancreas and non-Hodgkin lymphoma being the top five leading causes.

- Females had 43 percent of cancer deaths with lung and bronchus, breast, liver, colorectal and pancreas as the top five.

- Liver cancer had the highest death to case ratio followed by pancreas, lung and bronchus and brain and central nervous system.

- Cancer was the leading cause of years of potential life lost due to premature death in South Dakota.

Trends

- South Dakota's five-year cancer death rate fell by an annual percent change of 0.4 percent during 1997-2001.

- Esophageal cancer was the only site that showed a statistically significant increase.

Technical Notes

Cancer case definitions: A "cancer case" is defined as the primary cancer site, i.e., the site where the cancer started. Since an individual can have more than one primary cancer site, the number of incident cancer cases could be greater than the number of persons who are diagnosed with cancer. A metastasis is not a primary site.

Incidence: The measure of new cancer cases is incidence.

Incidence rate: This is a measure of the number of new cancer cases per 100,000 persons per year. In conformity with the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) Program guidelines, the incidence rates for cancer sites exclude the following:

• *In situ* cases, except bladder;

• Basal and squamous cell skin cancers;

• Cases with unknown age; and

• Cases with unknown gender.

Age-adjusted incidence rate: Age-adjusted incidence rates were calculated using the direct method and standardized to the age distribution of the 2000 U.S. Standard Population (Appendix A). Age adjustment allows rates for one geographic area to be compared with rates from other geographic areas that may have differences in age distributions. Any observed differences in age-adjusted incidence rates between populations are not due to different age structures. Reports prior to 1999 used the 1970 U.S. Standard Population.

Age-specific incidence rates: Age specific rates are calculated by dividing the number of cases for a given age group by the total population of that age group and are expressed as an average annual rate per 100,000 persons by age group. Age specific rates exclude the same types of cases that are excluded from age-adjusted incidence rates.

Age-adjusted death rates: Death rates are calculated for total cases and separately for males and females. The death rates are age-adjusted to the 2000 U.S. Standard Population using five-year groups, and are per 100,000 persons. Rates are presented for 2001 and for the five -year period, 1997-2001.

Risks and associated risk factors: These were developed using the "American Cancer Society Textbook of Oncology," and the Harvard Cancer Center, *Causes of Human Cancer*.

Stage at time of diagnosis: Staging is the process of describing the extent or spread of disease from the origin, which is the primary site. Summary staging is the standard used for comparison nationally. In 2001, the SEER Summary Stage 2000 was in effect. Summary stages are defined as follows:

In situ Malignant cells are within the cell group from which they arose, without penetration of the basement membrane of the tissue and no stromal invasion. *In situ* is "in place".
Localized The malignant cells are limited to the organ of origin and have spread no farther than the organ in which they started.
Regional The tumor is beyond the limits of the organ of origin by direct extension to adjacent areas with or without lymph node involvement.
Distant The primary tumor has broken away and has traveled, growing secondary tumors in other parts of the body. It has metastasized.

In situ and localized stages are the ***early stages*** of diagnosis. Regional and distant stages are *late stage* diagnoses. An **invasive cancer** refers to a cancer that has spread into surrounding tissues.

Years of life potential life lost (YPLL): The years of potential life lost is calculated for each individual who dies of a cancer of interest by determining the number of years of additional expected life if that person had lived to 75 years. The YPLL in the general population associated with a particular cancer is the sum of this expectation over all those individuals who died of that cancer in a particular year.

Average years of life lost (AYLL): This is the extent to which life is cut short due to premature death. This is obtained by dividing the YPLL by the number of deaths. Together with mortality rates, it shows a more complete picture of the burden of cancer. On average each person who dies from cancer loses 15 years of their life.

Confidence intervals (CI): A confidence interval tells how confident we are of the accuracy of the calculated rates. The SDCR uses a computed interval with a given probability of 95 percent, i.e., the true value of the calculated rate is contained within the interval. For example, given a calculated rate of 191.4 and a confidence interval of 182.1 to 200.8, it is better to say that the true rate will fall between 182.1 and 200.8. Of course, we can say with more certainty that it falls near the middle than near the edges. The larger the sample size, the shorter the interval size, giving us more certainty that the rate is correct.

Death/case ratio: This ratio is calculated by dividing the number of deaths in a given year by the number of new cancers diagnosed in the same year. The death to case ratio provides a crude indication of the prognosis for patients. A ratio approaching 1.0, when the number of deaths equals the number of cases for a particular type of cancer, indicates a poor prognosis. A lower ratio indicates fewer deaths relative to the number of cases and suggests a better prognosis.

Statistical significance: This determines whether an event happens by chance alone. The null hypothesis states that in a given place and a period of time, all events occur randomly by chance. If not, then there is statistical significance. Confidence intervals are used to test statistical significance in this report. If the confidence intervals of two different rates intersect each other, then there is no statistical difference between the two rates.[1] However, if the confidence intervals do not intersect one another there is statistical significance. This report looks at the South Dakota rates as compared to the U.S. national rates using SEER data. When CI for percentages contains zero, the rate is considered to be stable. Above zero, it is

the statistical significance is higher and below zero it is lower.

Annual percent change (APC):
The annual percent change is the average rate of change in a cancer rate per year in a given time frame indicating how fast or how slowly a cancer rate has increased or decreased each year over a period of years. A negative APC describes a decreasing trend, and a positive APC describes an increasing trend. In this report, a five-year period 1997-2001 was used and the calculations were made using SEER STAT.

Data source: All data, tables and figures come from the South Dakota Department of Health, *American Cancer Society Facts and Figures 2001* or *SEER Cancer Statistics Review 1975-2001* and should be cited as such if taken out of this report in part.

Disparity: Health disparities are differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States.[2] Health disparities can be defined as a specific group bearing a disproportionate share of negative health outcomes compared to the general population, i.e., disease, disability, and death.[3] Disparity can occur as a result of factors such as poverty, living in geographically underserved areas and belonging to specific minority groups.

Surveillance, Epidemiology and End Results (SEER): All of the national data came from SEER *Cancer Statistics Review 1975-2000.* Incidence data represent 10 percent of the U.S. population and mortality data represent the entire nation.

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[1] BIOSTATISTICS *The Bare Essentials,2nd edition Norman and Shreiner, Page 51*

[2] http://healthdisparities.nih.gov/whatare.html
[3] http://www.cdphe.state.co.us/tpi/healthdisparities.htm

Limitations to Data Interpretation and Comparison

A number of factors need to be considered when reviewing cancer statistics and interpreting them. A cancer registry database is a fluid and dynamic database, therefore, the reported number of new cases in a particular race, gender and age-cancer category may change for the calendar year for which the data have already been reported in a previous publication. Additional cancer cases which have been previously overlooked for a given diagnosis year may be found and reported to the central registry. There may also be elimination of duplicate records for the same patient, often due to name changes or spelling corrections.

__Rate comparisons:__ When comparing age-adjusted rates and age-specific rates based on fewer than 10 cases, rate comparisons are difficult to interpret. In comparing rates among geographic areas such as counties, states and health districts, the absolute numbers and differences in demographics should be considered, as well as clinical significance of the disease. Data quality indicators for each registry should also be reviewed. Interpretations without considering these factors may be misleading. There will also be differences between mortality statistics published by various agencies and the mortality rates in this report.

__Racial misclassifications:__ When race is not specified in a source document and the default is to record these cases as white or unknown, the results are considered biased. Numerator error can occur because of misclassification.

__Statistical significance:__ In South Dakota, case counts can be very low; therefore, magnitude bias is inherent with confidence intervals and z-tests. For example, in year 2001, cervical cancer rates were 10 per 100,000 American Indian women with 2 deaths and 1.7 per 100,000 white women with 6 deaths, i.e., American Indian women have a cervical cancer age-adjusted rate six times higher than white women in South Dakota.

However, the case counts were 2 for American Indians and 10 for whites. Small numbers result in wider confidence intervals, thus less confidence in the data.

__Early detection/screening:__ Improved early detection/screening may produce increases in both incidence and survival rates. Increases may occur as a result of the introduction of new procedures. The interval between the time a cancer is diagnosed by a screening procedure and the time when it would have been diagnosed in the absence of screening procedures is called the lead-time. Changes in lead-time, for example, in breast cancer diagnosis, have led to an increased survival and a reduction of mortality.

__Changes in diagnostic criteria__: Early detection resulting from either screening or early response to symptoms may result in increasing diagnosis in small tumors that are not yet life-threatening. This may raise incidence and survival rates but without changes in mortality rates. Cancers likely to be affected are breast, colon, cervix uteri, prostate and melanoma. Prostate cancer is particularly prone to changing diagnostic criteria.

__Comparison of this report with previous reports:__ It is important to note when reading this report that rates were calculated using the year 2000 U.S. Population Standard. Therefore, rates in this report cannot be compared to rates and trends in previous reports except for 1999 when the 2000 population data was first used. Reports prior to 1999 used the 1970 U.S. Standard Population to calculate rates.

__Staging:__ Advancement in diagnostic procedures may change in due time. Advances increase the probability that a given cancer will be diagnosed in a more advanced stage, for example, with new scanning methods, metastases can be detected. Therefore, if someone was previously diagnosed with a localized tumor, they may now be staged as distant. This is called stage migration and can affect the analysis of all solid tumors.

Cancer incidence

Only 2001 incidence data are included in this report. Year 2001 is the reference year for the SDCR and will serve as the baseline for future information on cancer incidence in South Dakota. Trends in incidence will not be presented as data for prior years did not attain the strict quality assurance and editing standards required for incidence data. It is advisable not to extrapolate 2001 incidence rates to what could be found consistently as considerable variations can occur from year to year, especially in a large rural state with small population such as it is in South Dakota.[4] For example, one additional case in a low population density can change the incidence rate to reflect statistical significance.

South Dakota collected 3,466 new cancer cases in 2001. Data at the county level range from a low of 121.9 in Perkins County to 658.4 in Brule County. There were three counties, viz., Brule, Minnehaha and Pennington Counties, that had rates statistically higher when compared to South Dakota's rate of 433 cases per 100, 000 persons. Ten counties, viz., Corson, Douglas, Gregory, Hanson, Hyde, Mellette, Moody, Perkins, Potter and Walworth had rates statistically lower than South Dakota's rate of 433 cases per 100,000 persons (Table 1).

Figure 1; Cancer incidence by county
South Dakota 2001

121.9-330.1
336.0-435.8
436.7-658.4
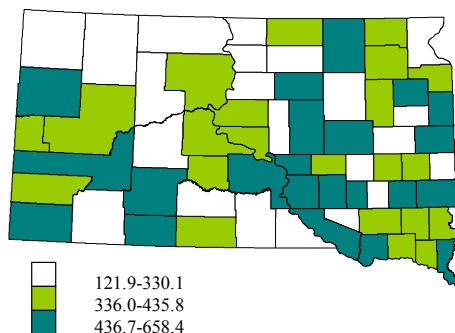
Note: Rates are per 100,000 persons and age-adjusted to the 2001 U.S population. Source: South Dakota Department of Health

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[4] South Dakota has an area of 77,121 square miles with a population of approximately 760,000 persons and a population density of 9.9 persons per square mile. Population densities range from a low of 1.3 in Ziebach County to a high of 183.3 persons per square mile in Minnehaha County.

Table 1: Cancer incidence by county,
South Dakota 2001

County	Cases	Rate
South Dakota	3,466	433.0
Aurora	18	491.2
Beadle	116	516.6
Bennett	15	482.7
Bon Homme	43	439.2
Brookings	103	437.0
Brown	180	440.2
Brule	40	658.4▲
Buffalo	8	636.0
Butte	59	559.2
Campbell	6	266.0
Charles Mix	53	478.3
Clark	22	435.8
Clay	40	388.5
Codington	121	443.8
Corson	6	182.4▼
Custer	36	377.8
Davison	114	522.5
Day	35	336.0
Deuel	28	455.1
Dewey	16	342.8
Douglas	13	240.7▼
Edmunds	19	313.3
Fall River	56	482.2
Faulk	17	448.8
Grant	35	351.2
Gregory	16	231.2▼
Haakon	8	283.2
Hamlin	19	303.0
Hand	26	436.7
Hanson	9	249.6▼
Harding	4	270.4
Hughes	72	408.5
Hutchinson	48	380.0
Hyde	5	172.0▼
Jackson	13	499.6
Jerauld	17	410.5
Jones	7	427.7
Kingsbury	26	262.4
Lake	53	389.9
Lawrence	95	402.0
Lincoln	75	358.8
Lyman	22	561.0
McCook	45	582.9
McPherson	19	381.8
Marshall	25	384.6
Meade	82	388.8
Mellette	4	177.9▼
Miner	17	400.2
Minnehaha	673	515.1▲
Moody	19	270.6▼
Pennington	430	512.9▲
Perkins	7	121.9▼
Potter	12	249.7▼
Roberts	39	329.8
Sanborn	11	295.2
Shannon	20	324.0
Spink	32	324.6
Stanley	9	354.0
Sully	8	407.2
Todd	18	374.8
Tripp	30	330.1
Turner	54	418.0
Union	67	502.4
Walworth	26	259.9▼
Yankton	102	428.3
Ziebach	3	303.8

Note: Rates are per 100,000 persons and age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Table 2: Age-adjusted incidence rates by county for selected sites, 2001

	Colorectal		Lung and Bronchus		Breast (Female)		Prostate		Bladder		NHL	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
South Dakota	**443**	**53.0**	**425**	**53.2**	**524**	**128.5**	**670**	**185.5**	**181**	**21.4**	**116**	**14.5**
Aurora	*	38.7	*	22.7	0	0.0	7	392.6	*	12.7	*	35.4
Beadle	19	76.2	6	26.7	11	89.6	28	281.9	13	52.3	3	18.0
Bennett	*	61.1	*	26.2	*	75.6	3	216.5	*	36.0	0	0.0
Bon Homme	7	53.3	*	16.3	10	239.8	5	104.4	*	9.3	*	23.4
Brookings	11	47.7	18	83.5	9	81.0	13	119.7	5	20.2	*	5.0
Brown	22	51.5	22	54.8	22	96.0	41	225.9	9	19.9	10	23.3
Brule	7	101.2	6	102.7	4	128.7	9	325.3	3	38.5	*	12.2
Buffalo	*	55.4	3	260.3	0	0.0	*	133.8	0	0.0	0	0.0
Butte	14	129.3	8	72.4	5	101.5	5	116.4	*	21.6	4	40.4
Campbell	*	32.3	0	0.0	*	50.9	*	120.2	0	0.0	*	34.5
Charles Mix	7	62.2	3	24.1	12	227.3	13	251.0	3	26.8	0	0.0
Clark	*	38.1	*	27.9	7	332.7	*	46.6	*	30.3	*	13.9
Clay	3	19.1	4	41.9	5	90.2	12	261.1	*	10.3	*	21.0
Codington	22	78.4	11	39.3	16	121.0	17	136.7	6	19.4	*	3.9
Corson	*	25.5	0	0.0	*	121.3	0	0.0	*	44.3	0	0.0
Custer	*	18.9	6	52.4	6	128.0	9	232.3	*	9.6	*	9.4
Davison	19	75.9	8	35.0	23	191.6	21	234.5	6	22.5	*	4.3
Day	7	72.3	3	35.9	3	70.7	10	214.5	3	22.6	*	15.8
Deuel	3	42.7	4	65.5	3	124.8	6	215.9	*	14.0	0	0.0
Dewey	*	57.1	3	62.1	3	107.3	3	144.4	0	0.0	0	0.0
Douglas	0	0.0	0	0.0	*	35.6	*	31.8	0	0.0	*	38.8
Edmunds	*	24.0	*	11.2	*	75.4	6	202.6	*	9.6	*	25.4
Fall River	8	64.1	8	67.9	8	175.6	9	155.8	*	16.4	4	29.5
Faulk	*	37.4	6	143.0	3	247.3	4	205.0	*	35.1	0	0.0
Grant	5	45.0	3	34.9	6	135.7	4	87.6	4	34.3	0	0.0
Gregory	*	13.8	*	26.8	5	203.9	4	107.1	*	10.1	0	0.0
Haakon	*	48.5	0	0.0	0	0.0	0	0.0	0	0.0	3	103.5
Hamlin	*	8.1	*	32.4	3	109.1	4	137.0	*	10.3	0	0.0
Hand	3	40.1	3	40.0	6	224.7	*	65.8	*	19.6	*	14.4
Hanson	*	47.8	*	56.4	*	54.4	*	62.8	0	0.0	0	0.0
Harding	*	69.2	0	0.0	0	0.0	*	142.1	0	0.0	*	55.8
Hughes	10	49.1	3	19.1	12	132.2	19	248.7	5	27.0	*	12.6
Hutchinson	12	84.2	7	37.3	6	119.3	10	159.4	*	7.2	*	5.8
Hyde	*	38.3	*	23.1	0	0.0	3	210.3	0	0.0	0	0.0
Jackson	0	0.0	5	191.1	0	0.0	3	220.8	0	0.0	*	33.7
Jerauld	0	0.0	0	0.0	4	161.2	4	234.9	3	74.3	*	21.1
Jones	0	0.0	*	71.4	*	320.1	*	219.1	*	58.1	0	0.0
Kingsbury	6	48.5	*	9.5	3	90.0	8	166.7	*	9.5	*	9.5
Lake	5	35.8	4	30.0	4	73.6	20	325.5	3	19.5	*	14.0
Lawrence	8	32.3	14	58.8	12	106.5	17	155.5	5	19.6	5	20.9
Lincoln	12	57.3	8	39.1	17	153.0	9	97.2	*	9.8	3	15.2
Lyman	*	23.4	6	153.8	3	148.7	*	131.3	*	23.5	0	0.0
McCook	8	92.6	*	9.1	14	352.0	5	129.4	3	41.6	0	0.0
McPherson	4	64.6	*	28.9	0	0.0	3	117.4	*	51.4	0	0.0
Marshall	4	76.9	4	60.1	*	73.7	6	206.1	4	42.4	0	0.0
Meade	7	32.7	12	56.8	16	149.5	18	179.4	*	4.8	3	15.0
Mellette	0	0.0	*	93.9	*	75.0	0	0.0	*	41.8	0	0.0
Miner	5	108.2	*	15.5	4	214.7	4	195.4	0	0.0	0	0.0
Minnehaha	70	53.6	95	74.2	109	152.3	125	227.7	28	21.6	24	17.9
Moody	*	29.4	3	40.6	4	109.4	3	87.7	*	9.5	*	17.8
Pennington	43	52.2	63	75.5	74	160.9	73	200.8	20	23.9	12	14.3
Perkins	0	0.0	*	18.2	*	58.4	*	68.2	*	14.4	0	0.0
Potter	*	12.9	*	18.4	3	101.8	*	97.0	0	0.0	*	22.7
Roberts	*	16.0	8	61.5	*	38.4	12	202.0	4	34.7	*	8.3
Sanborn	*	24.1	*	56.7	*	98.1	3	166.3	0	0.0	0	0.0
Shannon	*	27.9	4	68.1	0	0.0	3	82.1	3	52.1	*	27.8
Spink	3	26.7	3	31.0	5	112.5	7	149.9	*	18.6	*	8.9
Stanley	*	86.3	0	0.0	0	0.0	3	257.6	0	0.0	*	35.3
Sully	*	48.2	*	56.2	*	207.8	*	81.5	*	48.2	0	0.0
Todd	4	134.0	0	0.0	6	184.8	*	88.1	*	35.5	*	18.1
Tripp	7	76.2	4	39.8	*	53.3	3	78.7	3	26.4	4	46.6
Turner	11	76.4	4	26.0	5	69.1	10	177.1	3	17.7	*	5.6
Union	11	82.5	11	84.7	6	89.8	14	225.4	3	21.3	*	14.5
Walworth	4	38.2	*	11.0	5	101.1	7	149.2	*	21.2	0	0.0
Yankton	13	54.5	14	56.1	15	112.0	25	252.1	5	20.8	3	12.5
Ziebach	*	63.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Note: Counts less than 3 are suppressed. Incidence rates with counts less than 20 are generally considered unstable.
Rates are per 100,000 persons and age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Table 2 shows common cancer sites by counties. Counts less than 3 are suppressed. Incidence rates with counts less than 20 are generally considered unstable.

Stage at diagnosis

Overall 19 percent each of all cases for all cancers in South Dakota were diagnosed at regional and distant stages. Stage at diagnosis by race was as follows:

Figure 2: Stage at diagnosis in South Dakota Whites, 2001

Number of cases = 3,199
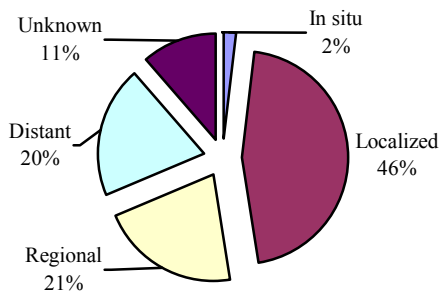
Figure 3: Stage at diagnosis in South Dakota American Indians, 2001

Number of cases= 103
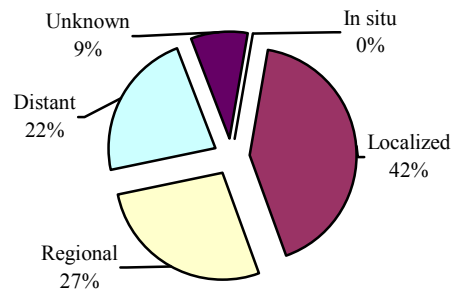
Source: South Dakota Department of Health

Cases of non-Hodgkin lymphoma, myeloma and leukemias are usually at distant stages, and therefore can skew the proportion of all sites diagnosed at distant stages. Some differences in case counts by stage for selected sites are shown in Table 3.

Table 3: Stage at diagnosis for common selected sites by race, South Dakota, 2001

Site	White				American Indian			
	Regional		Distant		Regional		Distant	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Breast (Female)	139	28%	21	4%	5	56%	0	0
Cervix uteri	7	30%	1	2%	1	1%	1	33%
Colorectal	163	40%	59	14%	3	27%	3	27%
Corpus and Uterus, NOS	16	16%	11	11 %	2	40%	0	0
Lung and Bronchus	98	25%	194	49%	7	35%	7	35%
Leukemia	0	0	93	100%	0	0	2	100%
Myeloma	0	0	30	100%	0	0	1	100%
Non-Hodgkin lymphoma	14	13%	45	43%	1	25%	2	50%
Prostate	72)	12%	31	5%	2	11%	1	1

Source: South Dakota Department of Health

Table 4: Cancer incidence by site and gender, South Dakota, 2001

	Total		Male		Female	
	Incidence	Rate	Incidence	Rate	Incidence	Rate
All sites	**3481**	**434.8**	**1884**	**523.5**	**1597**	**371.6**
Oral Cavity and Pharynx	**65**	**8.4**	**45**	**12.7**	**20**	**4.9**
Lip	16	2.1	16	4.5	0	0.0
Tongue	10	1.3	5	1.4	5	1.2
Salivary Glands	13	1.6	6	1.8	7	1.8
Floor of Mouth	3	0.4	2	0.5	1	0.2
Gum and Other Mouth	8	1.0	6	1.7	2	0.4
Oropharynx	1	0.1	1	0.3	0	0.0
Nasopharynx	3	0.4	2	0.6	1	0.3
Tonsil	7	1.0	5	1.4	2	0.5
Hypopharynx	3	0.4	2	0.6	1	0.2
Other Oral Cavity and Pharynx	1	0.1	0	0.0	1	0.2
Digestive System	**550**	**66.6**	**303**	**84.1**	**247**	**51.1**
Esophagus	39	5.0	32	8.8	7	1.5
Stomach	42	5.3	30	8.3	12	2.8
Small Intestine	18	2.2	11	3.0	7	1.3
Colon Excluding Rectum	344	40.9	167	46.5	177	35.6
Rectum and Rectosigmoid	99	12.1	60	16.7	39	8.5
Anus, Anal Canal and Anorectum	8	1.1	3	0.8	5	1.4
Liver and Intrahepatic Bile Duct	**116**	**14.3**	**51**	**14.0**	**65**	**14.2**
Liver	14	1.7	8	2.2	6	1.3
Intrahepatic Bile Duct	4	0.5	1	0.3	3	0.5
Gallbladder	4	0.4	0	0.0	4	0.6
Other Biliary	9	1.1	8	2.2	1	0.3
Pancreas	75	9.3	33	9.0	42	9.4
Retroperitoneum	2	0.3	1	0.3	1	0.2
Peritoneum, Omentum, Mesentery	8	1.0	0	0.0	8	1.8
Respiratory System	**460**	**57.6**	**292**	**80.8**	**168**	**39.1**
Nose, Nasal Cavity and Middle Ear	8	1.0	4	1.1	4	0.9
Larynx	23	2.9	19	5.3	4	0.9
Lung and Bronchus	425	53.2	265	73.2	160	37.3
Pleura	4	0.5	4	1.2	0	0.0
Bones and Joints	**1**	**0.1**	**0**	**0.0**	**1**	**0.2**
Soft Tissue (including heart)	**15**	**1.8**	**9**	**2.5**	**6**	**1.4**
Skin (excluding basal and squamous)	**94**	**12.1**	**48**	**13.3**	**46**	**11.0**
Melanoma of the Skin	91	11.7	45	12.4	46	11.0
Skin Other	3	0.4	3	0.8	0	0.0
Breast	**529**	**68.3**	**5**	**1.4**	**524**	**128.5**
Female Genital System	**213**	**50.9**			**213**	**50.9**
Cervix Uteri	27	7.3			27	7.3
Corpus Uteri	106	25.2			106	25.2

Table 4: Cancer incidence by site and gender, South Dakota 2001 (cont'd)

	Total		Male		Female	
	Incidence	Rate	Incidence	Rate	Incidence	Rate
Uterus, NOS	5	1.2			5	1.2
Ovary	54	12.7			54	12.7
Vagina	3	0.6			3	0.6
Vulva	16	3.6			16	3.6
Other Female Genital Organs	2	0.4			2	0.4
Male Genital System	**699**	**193.4**	**699**	**193.4**		
Prostate	670	185.5	670	185.5		
Testis	24	6.5	24	6.5		
Penis	3	0.8	3	0.8		
Other Male Genital Organs	2	0.6	2	0.6		
Urinary System	**280**	**33.7**	**197**	**55.7**	**83**	**17.4**
Bladder	181	21.4	136	38.7	45	8.9
Kidney and Renal Pelvis	92	11.5	57	15.8	35	7.9
Ureter	4	0.4	2	0.6	2	0.4
Other Urinary Organs	3	0.3	2	0.6	1	0.2
Eye and Orbit	**2**	**0.3**	**0**	**0**	**2**	**0.5**
Brain and Other Nervous System	**41**	**5.2**	**26**	**7.2**	**15**	**4.0**
Brain	38	5.0	25	6.9	13	3.2
Cranial Nerves and Other Nervous System	3	0.4	1	0.3	2	0.5
Endocrine System	**41**	**5.6**	**11**	**3.1**	**30**	**8.2**
Thyroid	39	5.3	11	3.1	28	7.7
Other Endocrine	2	0.3	0	0.0	2	0.6
Lymphomas	**136**	**17.1**	**64**	**17.7**	**72**	**17.0**
Hodgkin Lymphoma	20	2.6	7	1.9	13	3.5
Non-Hodgkin Lymphoma	116	14.5	57	15.8	59	13.5
Myeloma	**36**	**4.5**	**25**	**7.0**	**11**	**2.5**
Leukemia	**104**	**12.8**	**64**	**18.0**	**40**	**9.1**
Acute Lymphocytic	6	0.8	4	1.1	2	0.6
Chronic Lymphocytic	34	4.1	21	6.0	13	2.8
Other Lymphocytic	3	0.3	1	0.3	2	0.3
Acute Myeloid	19	2.3	10	2.7	9	2.2
Chronic Myeloid	5	0.7	4	1.1	1	0.3
Chronic Myeloproliferative Disorders	16	2.0	8	2.3	8	2.0
Myelodysplastic Syn	13	1.5	11	3.2	2	0.4
Aleukemic, Subleukemic and NOS	8	1.0	5	1.4	3	0.7
Hematopoietic/Reticuloendothelial Sys	**4**	**0.5**	**3**	**0.9**	**1**	**0.2**
Peripheral Nerves/Autonomic Nervous Sys	**1**	**0.1**	**0**	**0.0**	**1**	**0.3**
Ill-Defined and Unspecified Sites	**94**	**11.4**	**42**	**11.9**	**52**	**11.4**

Incidence rates are age-adjusted to the 2001 U.S. standard population ; Source: South Dakota Department of Health

Table 4 shows incidence and age-adjusted incidence rates for South Dakota in 2001 by primary sites and gender according to SEER recodes (Appendix D). Some rates such as melanomas and leukemias are incomplete and the rates would be higher if all the cases were collected. Cases from other sites such as breast cancer have attained case completeness.

Table 5: Percentage of selected cancers by age groups in South Dakota, 2001

	0-19	20-34	35-49	50-64	65-74	75-84	85 +
All sites	**1%**	**2%**	**9%**	**25%**	**30%**	**26%**	**7%**
Breast (female)	0%	1%	19%	33%	23%	20%	5%
Brain	7%	7%	10%	32%	29%	10%	5%
Cervix Uteri	0%	11%	52%	19%	4%	15%	0%
Colorectal	0%	1%	4%	15%	30%	32%	18%
Hodgkin Lymphoma	30%	30%	15%	15%	5%	5%	0%
Leukemia	5%	1%	12%	17%	23%	32%	10%
Lung and Bronchus	0%	0%	5%	26%	35%	31%	3%
Melanomas of the Skin	0%	2%	18%	30%	24%	16%	10%
Non-Hodgkin Lymphoma	3%	3%	7%	23%	46%	12%	6%
Prostate	0%	0%	2%	23%	44%	26%	5%

Source: South Dakota Department of Health

In 2001, 55 percent of all cancers were diagnosed between ages 50-74 (Table 5). Notable are the 19 percent of breast cancers and 52 percent of cervical cancer diagnosed between ages 35-49. Sixty percent of the 20 Hodgkin lymphoma cases were diagnosed in persons under 34 years old.

Figure 4 below shows that incidence rates for American Indians in South Dakota were lower than those of whites. The rates would increase somewhat if some cases were misclassified for race but this still would not amount to a dramatic increase. Of the 3,481 cases included in the rates, 103 or three percent were American Indians, 61 males and 42 females.

Figure 4: All sites cancer incidence rates by race in South Dakota, 2001
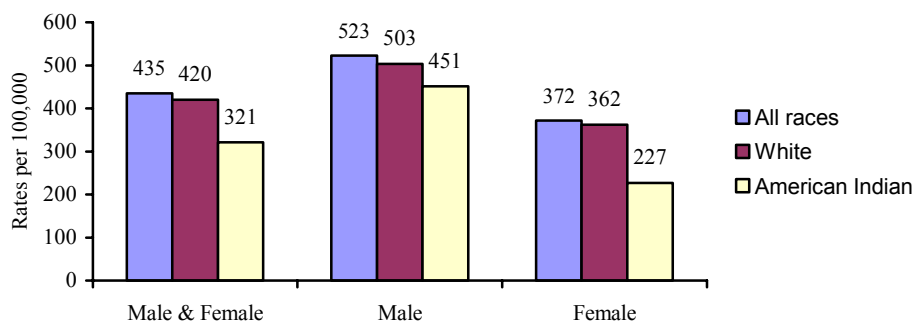
Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Cancer cases and deaths by rank

Prostate cancer was the most common cancer diagnosed during 2001. The top four cancers, prostate, breast, colorectal and lung and bronchus accounted for 59 percent of cancers cases and 50 percent of deaths. Figure 5 shows new cancer cases and deaths by rank and gender.

Figure 5: Percent distribution of cancer cases and deaths by rank, South Dakota 2001

Males

	Percent of new cases	Percent of deaths
Prostate	36	1
Lung and bronchus	14	30
Colorectal	12	11
Bladder	7	13
Leukemia	3	1
Kidney and renal pelvis	3	3
Non-Hodgkin lymphoma	3	5
Oral cavity and pharynx	2	1
Pancreas	2	5
Esophagus	2	3
Stomach	2	2
Brain and other nervous system	1	3
Myeloma	1	2
Larynx	1	1
Thyroid	1	0
Liver	0	2
Breast	0	0
All other sites	9	8

Females

	Percent of new cases	Percent of deaths
Breast	33	12
Colorectal	14	21
Lung and bronchus	10	11
Corpus Uterus	7	5
Non-Hodgkin lymphoma	4	6
Ovary	3	7
Bladder	3	2
Pancreas	3	7
Leukemia	2	4
Kidney and renal pelvis	2	2
Thyroid	2	0
Cervix Uteri	2	5
Oral Cavity and pharynx	1	1
Brain and other nervous system	1	2
Stomach	1	1
Myeloma	1	2
Liver	1	1
Esophagus	0	1
Larynx	0	0
All other sites	11	8

Source: South Dakota Department of Health

Cancer mortality

Cancer age-adjusted death rates for 2001 ranged from a low of zero in Ziebach County to 362.3 deaths per 100,000 persons in Shannon County. South Dakota's rate was 190.7 and the U.S. rate was 199.8 in 2001.

For the period 1997-2001, rates ranged from a low of 139.8 in Marshall County to 291.8 in Shannon County. Shannon County was the only county with a five-year age-adjusted death rate that was statistically higher than the five-year South Dakota rate. Nine counties achieved the Healthy People 2010 Objective of 159.9 deaths per 100,000 persons. These were Bob Homme, Clark, Faulk, Jackson, Jerauld, McPherson, Marshall, Miner and Ziebach.

Figure 6: All sites age-adjusted cancer death rates in South Dakota, 1997-2001
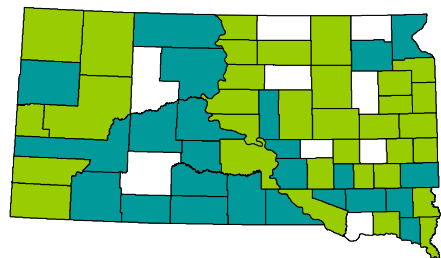
☐ ≤ 159.9 deaths per 100,000 persons
▨ >159.9 and < 199.8 per 100,000 persons
▨ >199.8 deaths per 100,000 persons
Source: South Dakota Department of Health

Notes for Table 6

Rates are adjusted to the 2001 U.S. standard population.
Rates for counties with less than 20 are considered unstable and should be used with caution.
▼Statistical significance lower when compared with the SD rate.
▲ Statistical significance higher than the SD rate.
Healthy People 2010 Objective is 159.9 cancer deaths per 100,000 persons.
Source: South Dakota Department of Health

Table 6: All sites cancer mortality by county, South Dakota, 2001 and 1997-2001

| County	2001		1997-2001		HP 2010 for 1997-2001
	Deaths	Rate	Deaths	Rate	
South Dakota	**1,598**	**190.7**	**7,954**	**190.1**	**No**
Aurora	14	314.3	8	170.0	No
Beadle	36	157.8	47	199.2	No
Bennett	9	288.5	7	208.6	No
Bon Homme	25	197.5	17	137.2	**Yes**
Brookings	43	174.5	42	168.6	No
Brown	80	185.1	86	197.9	No
Brule	14	209.8	14	203.6	No
Buffalo	4	432.6	3	253.7	No
Butte	38	355.3	24	222.4	No
Campbell	6	209.1	5	175.3	No
Charles Mix	10	70.0▼	23	189.5	No
Clark	6	93.5	10	153.2	**Yes**
Clay	26	243.4	23	212.1	No
Codington	51	181.1	56	193.7	No
Corson	4	134.2	7	225.8	No
Custer	19	203.7	16	181.2	No
Davison	45	193.8	48	208.4	No
Day	18	172.0	22	208.0	No
Deuel	8	111.8	11	166.5	No
Dewey	8	217.0	9	228.7	No
Douglas	11	178.6	14	236.1	No
Edmunds	9	153.1	12	182.9	No
Fall River	26	208.6	23	181.6	No
Faulk	7	177.2	7	152.4	**Yes**
Grant	24	207.7	19	174.8	No
Gregory	15	175.2	17	208.1	No
Haakon	3	105.7	8	224.6	No
Hamlin	14	167.1	13	160.0	No
Hand	9	158.1	11	176.2	No
Hanson	6	156.5	7	192.7	No
Harding	<3	NA	<3	NA	No
Hughes	30	171.5	29	160.2	No
Hutchinson	33	208.6	33	226.6	No
Hyde	6	240.9	6	207.5	No
Jackson	4	135.3	3	116.2	**Yes**
Jerauld	4	90.8	6	141.2	**Yes**
Jones	4	243.2	4	255.6	No
Kingsbury	20	176.3	20	190.5	No
Lake	34	238.0	25	176.7	No
Lawrence	39	157.1	44	177.9	No
Lincoln	45	211.4	36	169.7	No
Lyman	6	141.3	8	196.6	No
McCook	16	168.5	15	160.6	No
McPherson	10	144.2	10	140.0	**Yes**
Marshall	11	149.5	10	139.8	**Yes**
Meade	34	164.0	35	169.1	No
Mellette	5	257.0	5	261.0	No
Miner	4	64.2▼	8	155.1	**Yes**
Minnehaha	266	202.3	265	200.9	No
Moody	11	148.5	13	164.5	No
Pennington	182	220.1	166	200.4	No
Perkins	12	193.2	11	186.9	No
Potter	10	283.6	9	198.6	No
Roberts	32	234.2	29	221.7	No
Sanborn	4	115.6	7	198.1	No
Shannon	21	362.3	17	297.8	No
Spink	14	137.6	17	162.2	No
Stanley	7	303.9	7	274.7	No
Sully	<3	NA	4	196.5	No
Todd	10	224.6	9	203.7	No
Tripp	24	252.3	19	208.8	No
Turner	28	218.2	29	209.6	No
Union	27	197.9	24	180.9	No
Walworth	20	228.3	15	165.5	No
Yankton	35	143.3	41	164.6	No
Ziebach	0	0.0	<3	NA	**Yes**

Table 7: Age-adjusted death rates for selected sites by county, South Dakota, 2001

	Colorectal		Lung/Bronchus		Breast (Female)		Prostate		Bladder		NHL	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
South Dakota	179	20.9	414	50.7	88	19.2	115	33.6	36	4.0	83	9.7
Aurora	5	103.6	3	96.1	0	0.0	*	37.0	0	0.0	0	0.0
Beadle	4	17.8	13	58.4	*	26.2	*	20.1	0	0.0	*	3.7
Bennett	*	26.2	*	35.8	*	70.0	0	0.0	0	0.0	0	0.0
Bon Homme	3	23.3	6	50.3	4	49.3	*	19.3	*	6.2	*	13.2
Brookings	4	16.9	11	48.5	3	25.9	5	49.9	*	3.7	0	0.0
Brown	11	25.8	17	40.1	4	19.4	7	41.9	0	0.0	*	4.1
Brule	*	31.7	3	42.6	0	0.0	*	29.0	0	0.0	0	0.0
Buffalo	0	0.0	*	180.6	0	0.0	0	0.0	0	0.0	0	0.0
Butte	4	37.8	15	141.9	*	46.3	3	81.6	0	0.0	*	19.0
Campbell	*	80.7	*	28.1	0	0.0	0	0.0	0	0.0	*	32.3
Charles Mix	3	19.7	*	7.1	*	11.7	*	16.6	0	0.0	0	0.0
Clark	0	0.0	*	19.1	*	18.0	*	36.8	*	11.8	0	0.0
Clay	3	27.8	7	63.1	*	10.5	*	21.0	0	0.0	3	27.6
Codington	7	24.6	14	52.3	4	27.3	*	7.4	0	0.0	4	13.0
Corson	0	0.0	*	30.2	0	0.0	0	0.0	*	80.7	0	0.0
Custer	*	9.6	10	107.8	*	23.5	0	0.0	*	9.6	0	0.0
Davison	3	10.4	11	46.0	*	10.3	*	24.0	0	0.0	3	13.9
Day	*	10.1	5	39.5	3	44.5	0	0.0	*	7.8	0	0.0
Deuel	*	10.5	4	56.9	0	0.0	0	0.0	0	0.0	0	0.0
Dewey	0	0.0	4	105.1	*	46.6	0	0.0	0	0.0	0	0.0
Douglas	*	34.0	*	16.0	0	0.0	*	92.0	0	0.0	*	17.0
Edmunds	*	9.6	0	0.0	*	51.4	*	28.7	0	0.0	0	0.0
Fall River	3	25.4	10	75.8	*	36.5	*	34.5	0	0.0	*	18.1
Faulk	0	0.0	*	44.9	0	0.0	0	0.0	*	20.1	*	35.1
Grant	4	36.2	*	10.4	*	45.0	3	54.6	0	0.0	0	0.0
Gregory	*	13.8	3	36.5	0	0.0	*	49.7	0	0.0	*	9.7
Haakon	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Hamlin	*	29.3	0	0.0	0	0.0	*	26.3	*	8.1	*	17.6
Hand	0	0.0	*	39.3	0	0.0	0	0.0	0	0.0	*	12.1
Hanson	*	26.2	*	47.8	0	0.0	0	0.0	0	0.0	0	0.0
Harding	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	*	55.8
Hughes	4	20.6	7	40.3	*	7.3	*	16.2	*	12.6	0	0.0
Hutchinson	5	34.0	7	37.9	3	28.9	*	27.6	*	9.6	*	7.6
Hyde	*	67.6	3	133.6	0	0.0	*	100.0	0	0.0	0	0.0
Jackson	0	0.0	3	101.6	0	0.0	*	111.5	0	0.0	0	0.0
Jerauld	*	21.1	*	36.7	0	0.0	*	42.5	0	0.0	0	0.0
Jones	0	0.0	*	71.4	*	134.2	*	109.6	0	0.0	0	0.0
Kingsbury	*	13.9	*	17.0	4	82.1	*	25.4	*	6.4	3	26.6
Lake	4	25.6	8	61.9	3	31.5	*	33.1	*	7.3	0	0.0
Lawrence	4	16.4	12	47.8	*	8.7	4	40.4	*	4.6	*	7.4
Lincoln	4	19.0	8	39.8	3	31.8	6	73.7	*	3.8	0	0.0
Lyman	0	0.0	3	67.5	0	0.0	*	42.5	0	0.0	0	0.0
McCook	*	14.3	3	30.0	*	34.0	0	0.0	*	7.1	*	29.6
McPherson	*	14.8	*	13.6	0	0.0	*	29.3	0	0.0	*	15.3
Marshall	3	39.8	*	24.3	0	0.0	0	0.0	0	0.0	0	0.0
Meade	0	0.0	12	59.6	*	7.6	3	39.8	*	4.9	4	19.1
Mellette	*	42.2	*	132.8	*	62.0	0	0.0	*	42.2	0	0.0
Miner	0	0.0	*	15.5	*	50.6	0	0.0	0	0.0	*	18.2
Minnehaha	24	17.9	76	59.2	12	16.3	15	30.6	6	4.6	17	12.9
Moody	0	0.0	5	73.2	0	0.0	*	65.3	0	0.0	0	0.0
Pennington	18	21.5	44	52.8	11	22.5	14	42.5	5	6.1	9	10.8
Perkins	*	14.4	3	50.4	0	0.0	0	0.0	0	0.0	3	53.8
Potter	*	31.3	*	30.1	*	19.9	*	36.9	0	0.0	*	12.9
Roberts	3	16.5	8	61.1	*	14.2	7	121.3	*	7.3	0	0.0
Sanborn	*	32.3	*	24.1	0	0.0	0	0.0	0	0.0	0	0.0
Shannon	4	68.8	6	108.6	0	0.0	*	24.9	*	12.3	*	12.4
Spink	*	9.0	4	37.8	0	0.0	*	21.7	0	0.0	4	41.2
Stanley	*	35.3	*	44.3	0	0.0	3	301.7	0	0.0	0	0.0
Sully	*	44.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Todd	0	0.0	*	44.4	*	29.0	*	38.5	*	22.1	0	0.0
Tripp	4	44.2	7	71.1	*	35.0	*	22.1	0	0.0	0	0.0
Turner	4	24.3	7	62.9	*	18.9	*	16.4	*	8.6	*	5.6
Union	9	64.7	5	37.7	*	15.8	4	60.7	*	6.9	*	7.4
Walworth	0	0.0	6	65.1	*	38.5	*	31.6	0	0.0	3	27.6
Yankton	4	17.1	11	46.8	*	4.1	*	9.0	0	0.0	3	11.6
Ziebach	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Note: Counts less than 3 are suppressed; Rates are per 100,000 persons and are age-adjusted to the 2000 U.S. standard population.
Rates from counts less than 20 are considered unstable;
Source: South Dakota Department of Health

Table 8: Mortality by site and gender in South Dakota, 2001

	Total		Male		Female	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
All sites	**1598**	**190.7**	**889**	**251.2**	**709**	**148.5**
Oral Cavity and Pharynx	**20**	**2.3**	**10**	**2.7**	**10**	**2.0**
Lip	0	0.0	0	0.0	0	0.0
Tongue	6	0.7	3	0.8	3	0.6
Salivary Gland	5	0.6	3	0.9	2	0.4
Floor of Mouth	0	0.0	0	0.0	0	0.0
Gum and Other Mouth	1	0.1	1	0.2	0	0.0
Nasopharynx	0	0.0	0	0.0	0	0.0
Hypopharynx	0	0.0	0	0.0	0	0.0
Tonsil	2	0.2	2	0.5	0	0.0
Oropharynx	2	0.3	0	0.0	2	0.5
Other Oral Cavity and Pharynx	4	0.4	1	0.3	3	0.5
Digestive System	**244**	**28.8**	**150**	**42.5**	**94**	**18.3**
Esophagus	35	4.2	28	7.7	7	1.4
Stomach	27	3.3	19	5.3	8	1.7
Small Intestine	3	0.3	1	0.3	2	0.4
Colorectal	179	20.9	102	28.5	77	14.9
Colon Excluding Rectum	162	18.7	91	26.1	71	13.7
Rectum and Rectosigmoid	17	2.1	11	3.1	6	1.2
Anus, Anal Canal and Anorectum	0	0.0	0	0.0	0	0.0
Liver and Intrahepatic Bile Duct	162	19.8	84	23.3	78	16.5
Liver	24	3.0	14	3.9	10	2.2
Intrahepatic Bile Duct	12	1.6	11	3.1	1	0.2
Gallbladder	12	1.4	5	1.4	7	1.2
Other Biliary	5	0.6	3	0.8	2	0.4
Pancreas	99	12.2	48	13.3	51	11.3
Retroperitoneum	1	0.1	0	0.0	1	0.3
Peritoneum, Omentum and Mesentery	3	0.3	0	0.0	3	0.5
Other Digestive Organs	6	0.6	3	0.8	3	0.4
Respiratory System	**424**	**51.9**	**271**	**75.6**	**153**	**34.0**
Nose, Nasal Cavity and Middle Ear	2	0.2	0	0.0	2	0.5
Larynx	6	0.8	6	1.7	0	0.0
Lung and Bronchus	414	50.7	264	73.7	150	33.3
Pleura	1	0.1	0	0.0	1	0.2
Trachea and Other Respiratory Organs	1	0.1	1	0.3	0	0.0
Bones and Joints	**3**	**0.4**	**1**	**0.3**	**2**	**0.4**
Soft Tissue (including heart)	**6**	**0.8**	**3**	**0.8**	**3**	**0.8**
Skin (excluding basal and squamous)	**32**	**3.9**	**23**	**6.5**	**9**	**2.3**
Melanomas Skin	25	3.1	17	4.7	8	2.1
Other Nonepithelial Skin	7	0.8	6	1.8	1	0.2
Breast	**90**	**19.6**	**2**	**0.6**	**88**	**19.2**
Female Genital System	**93**	**19.6**			**93**	**19.6**
Cervix Uteri	8	2.1			8	2.1
Corpus and uterus, NOS	34				34	
Corpus Uteri	15	3.2			15	3.2
Uterus, NOS	19	3.4			19	3.4

Table 8: Mortality by site and gender in South Dakota, 2001 (cont'd)

	Total		Male		Female	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
Ovary	47	10.1			47	10.1
Vulva	3	0.6			3	0.6
Other Female Genital Organs	0	0.0			0	0.0
Male Genital System	**116**	**33.9**	**116**	**33.9**		
Prostate	115	33.6	115	33.6		
Testis	1	0.3	1	0.3		
Urinary System	**81**	**9.4**	**54**	**15.4**	**27**	**4.9**
Bladder	36	4.0	25	7.1	11	1.8
Kidney and Renal Pelvis	44	5.2	28	8.0	16	3.1
Ureter	1	0.1	1	0.3	0	0.0
Eye and Orbit	**2**	**0.3**	**1**	**0.3**	**1**	**0.3**
Brain and Other Nervous System	**39**	**5.0**	**23**	**6.4**	**16**	**3.7**
Brain	38	4.8	23	6.4	15	3.4
Cranial Nerves and Other Nervous Sys	1	0.1	0	0.0	1	0.3
Endocrine System	**6**	**0.7**	**2**	**0.5**	**4**	**0.9**
Thyroid	5	0.6	2	0.5	3	0.6
Adrenal Gland	1	0.1	0	0.0	1	0.2
Other Endocrine Glands (incl. thymus)	0	0.0	0	0.0	0	0.0
Lymphomas	**85**	**10.0**	**44**	**12.4**	**41**	**7.9**
Hodgkin Disease	2	0.3	2	0.6	0	0.0
Non-Hodgkin Lymphomas	83	9.7	42	11.8	41	7.9
Multiple Myeloma	**31**	**3.7**	**14**	**4.0**	**17**	**3.8**
Leukemias	**99**	**12.2**	**61**	**17.2**	**38**	**8.6**
Leukemias – Lymphocytic	21	2.4	13	3.8	8	1.3
Acute Lymphocytic Leukemia	5	0.6	3	0.8	2	0.4
Chronic Lymphocytic Leukemia	16	1.7	10	2.9	6	0.9
Leukemias - Myeloid	31	3.7	17	4.7	14	3.0
Acute Myeloid Leukemia	24	2.9	13	3.5	11	2.5
Chronic Myeloid Leukemia	4	0.5	3	0.8	1	0.2
Other Myeloid Leukemia	3	0.3	1	0.3	2	0.4
Leukemias - Monocytic	**0**	**0.0**	**0**	**0.0**	**0**	**0.0**
Acute Monocytic Leukemia	0	0.0	0	0.0	0	0.0
Other Monocytic Leukemia	0	0.0	0	0.0	0	0.0
Leukemias - Other	20	2.4	12	3.3	8	1.5
Other Acute Leukemia	11	1.3	8	2.2	3	0.5
Other Chronic Leukemia	1	0.1	1	0.3	0	0.0
Aleukemic, Subleukemic, and NOS	8	1.0	3	0.8	5	0.9
Ill-Defined and Unspecified Sites	**92**	**10.6**	**49**	**14.1**	**43**	**8.3**

Death rates are per 100,000 persons and age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Table 8 shows deaths and age-adjusted death rates by SEER recode primary sites (Appendix E) and gender. Approximately 1,600 persons have died from cancer South Dakota for many years without much change in counts. Overall more males than females die from cancer.

**Table 9: Percentage of cancer deaths by age groups,
South Dakota, 2001**

Age group	0-19	20-34	35-49	50-64	65-74	75-84	85 +
All sites	<1%	1%	5%	17%	26%	32%	19%
Breast (female)	0%	2%	14%	22%	17%	20%	25%
Colorectal	0%	1%	3%	15%	27%	25%	30%
Corpus and Uterus NOS	0%	0%	3%	18%	15%	26%	38%
Kidney and Renal Pelvis	2%	2%	5%	20%	11%	34%	25%
Leukemias	<1%	1%	5%	17%	25%	30%	21%
Lung and Bronchus	0%	0%	3%	22%	32%	33%	10%
Non-Hodgkin Lymphoma	<1%	0%	6%	13%	20%	37%	23%
Ovary	0%	4%	4%	11%	38%	28%	15%
Pancreas	0%	0%	4%	18%	39%	31%	7%
Prostate	0%	0%	0%	8%	15%	44%	33%

Source: South Dakota Department of Health

Overall, in 2001more persons 75-84 years old died from cancer in South Dakota than any other age group (Table 9). However, there is cause for concern when too many people have died from cancers at a young age. For example, 16 percent of breast cancer deaths, nine percent of kidney and renal pelvis cancer deaths and approximately seven percent of non-Hodgkin lymphoma deaths were persons under 50 years old.

Figure 7: All sites cancer death rates by race, South Dakota, 1997-2001
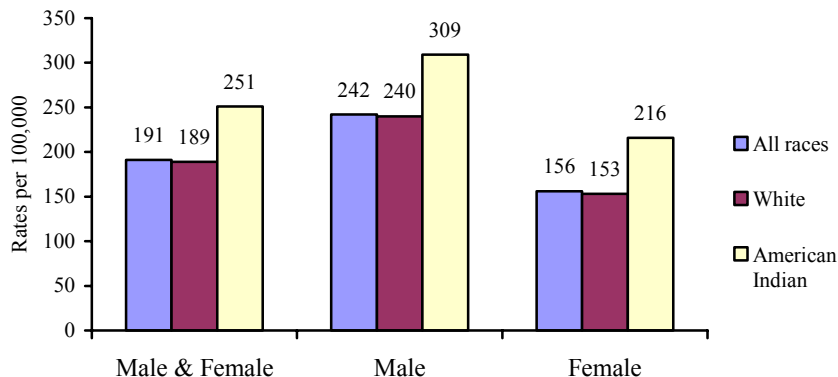

Note: Rates are per 100,000 persons and age adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Figure 7 illustrates the disparities for the five-year period 1997-2001. Males had higher death rates than females for all races, whites and American Indians. American Indians had higher rates than all races and whites. American Indian females are worse off than American Indian males when compared to their white counterparts; the ratio is 1.4 American Indian females/white females compared to 1.3 for American Indian males/white males.

Trends in death rates

Overall cancer age-adjusted death rates decreased during the period 1997-2001 with a stable -0.4 APC. Figure 8 shows trends of selected sites. Esophageal cancer was the only cancer showing statistical significance with an APC of 8.7 with a confidence interval 5.7 to 11.8. All other cancer sites had confidence intervals containing zero, hence the APC is considered stable whether positive or negative.

Figure 8: Trends in death rates for selected cancer sites, all races, South Dakota, 1997-2001
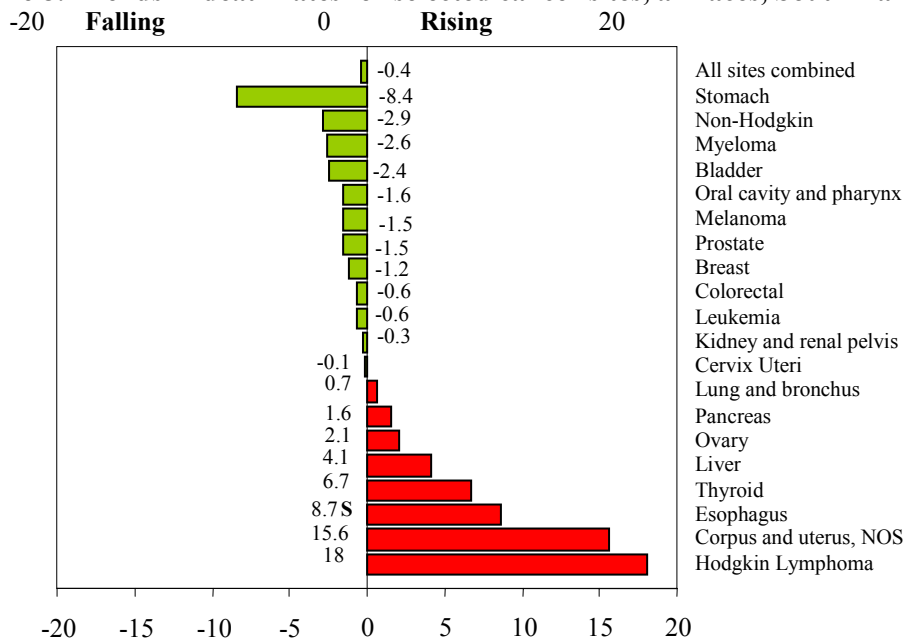
Note: **S** The annual percent change is significantly different from zero (p<0.05) ; Calculated using SEER Stat
Source: South Dakota Department of Health

Table 10 illustrates trends for selected sites by race and shows that death rates for American Indians have decreased faster than those for whites for all sites combined.

Table 10: Annual percent change of selected sites by race, South Dakota 1997-2001

Site	APC	
	White	American Indian
All cancer sites	-0.3	-1.7
Stomach	-7.7	-8.0
Bladder	-2.6	*
Non-Hodgkin lymphoma	-2.3	*
Bladder	-2.0	*
Prostate	-1.3	*
Melanoma (skin)	-1.0	*
Colorectal	-0.9	12.4
Brain & CNS	-0.9	*
Breast (female)	-0.9	*
Kidney and renal pelvis	-0.9	*
Leukemia	-0.8	
Oral cavity and pharynx	-0.6	*
Lung and bronchus	0.9	-3.0
Thyroid	1.3	*
Pancreas	2.2	-0.5
Ovary	2.5	-3.3
Cervix	3.9	*
Liver and bile duct	5.1	13.1
Esophagus	8.3S	*
Uterus	12.0	*

Source: South Dakota Department of Health ; Calculated with SEER Stat: *Counts were too low to calculate
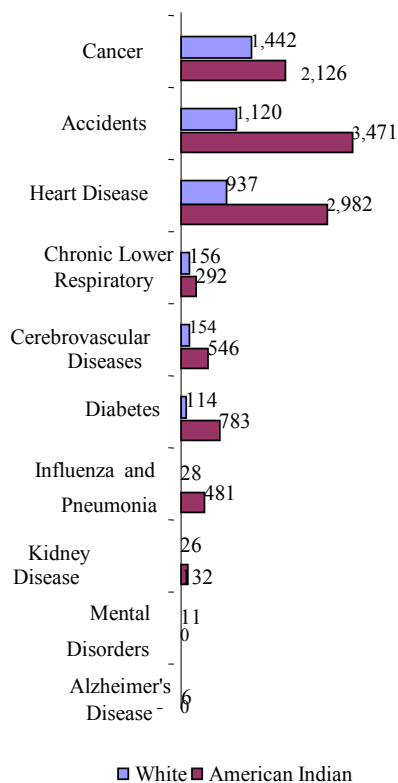
Years of potential life lost

In both 2001 and the five-year period1997-2001, cancer ranked first in years of potential years lost (YPLL) age-adjusted rates (Figures 9 and 10). In 2001 American Indians had an age-adjusted YPLL of 1.5 times that of whites. However, in the five-year period 1997-2001 it was 1.3 times that of whites. For 2001 the YPLL to 75 years of age due to malignant neoplasms in South Dakota was 10,194 years, making it the highest of all causes followed by accidents with 9,615 years and heart disease with 7,196 years.

Table 11: Leading causes of years of potential life lost (to 75 years of age), South Dakota, 2001

Malignant Neoplasms	10,194
Accidents	9,615
Heart Disease	7,196
Suicide & Self-Inflicted Injury	3,733
Cirrhosis	1,630
Cerebrovascular Disease	1,205
Chronic Lung Disease	1,128
Diabetes Mellitus	1,014
Homicide	761
Pneumonia & Influenza	470
All Other Causes	11,793

Source: South Dakota Department of Health

Figure 9: Leading cause of years of potential life lost before age 75 in South Dakota, age-adjusted rates 2001

Note: Rates are age-adjusted to the 2001 U.S. standard population.
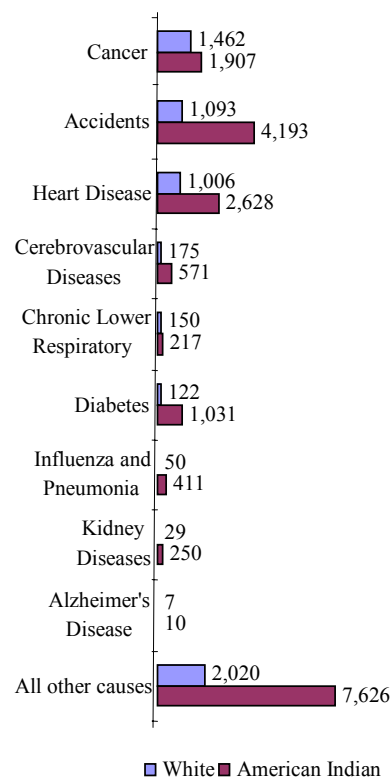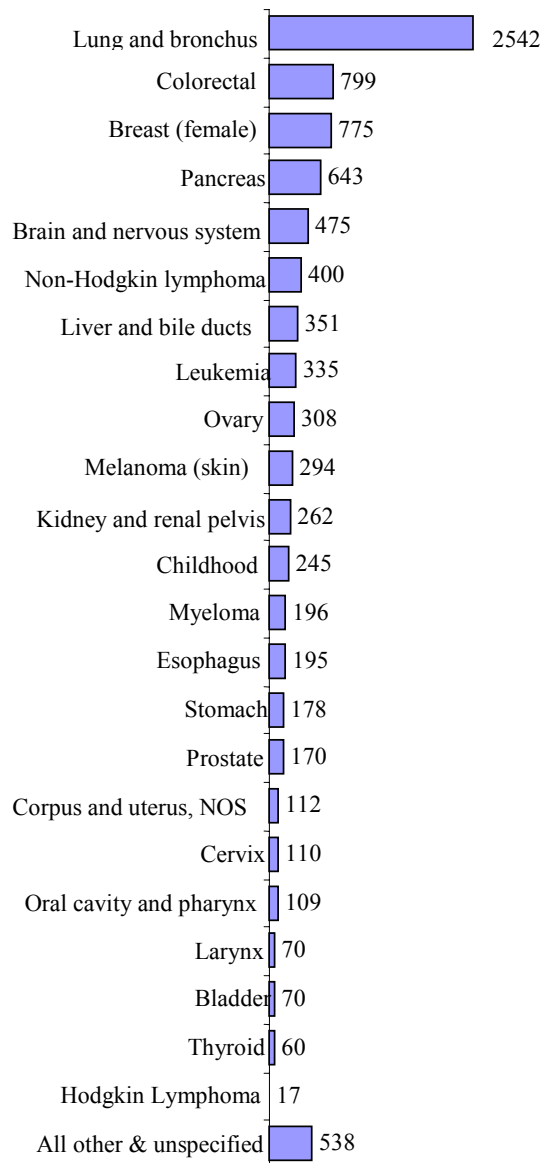Source: South Dakota Department of Health

Figure 10: Leading cause of years of potential life lost before age 75 in South Dakota, age-adjusted rates 1997-2001

Note: Rates are age-adjusted to the 2000 U.S. standard population.
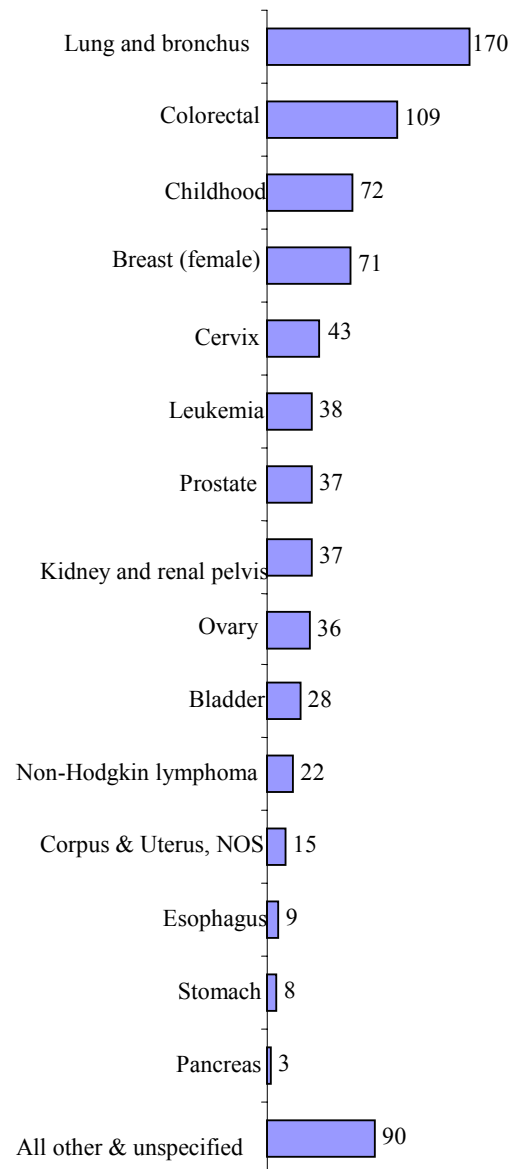Source: South Dakota Department of Health

The differences in YPLL in Figures 11 and 12 reflect the number of cases by primary sites. For example, the YPLL for lung and bronchus for whites was 2,542 for 398 deaths whereas the YPLL for American Indians was 170 years for the 9 deaths which occurred during 2001. Not all cancers were present among the American Indian population during 2001, hence the differences in the cancer sites presented.

Figure 11: Years of potential life lost for selected cancers among whites, South Dakota, 2001

Cancer site	YPLL
Lung and bronchus	2542
Colorectal	799
Breast (female)	775
Pancreas	643
Brain and nervous system	475
Non-Hodgkin lymphoma	400
Liver and bile ducts	351
Leukemia	335
Ovary	308
Melanoma (skin)	294
Kidney and renal pelvis	262
Childhood	245
Myeloma	196
Esophagus	195
Stomach	178
Prostate	170
Corpus and uterus, NOS	112
Cervix	110
Oral cavity and pharynx	109
Larynx	70
Bladder	70
Thyroid	60
Hodgkin Lymphoma	17
All other & unspecified	538

Source: South Dakota Department of Health

Figure 12: Years of potential life lost for selected cancers among American Indians, South Dakota, 2001

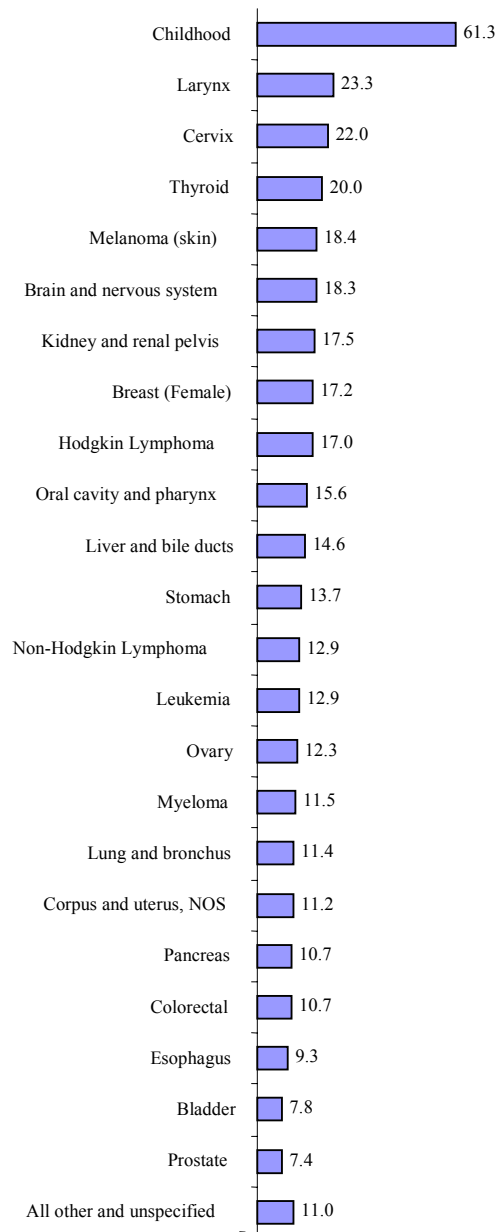| Cancer site	YPLL
Lung and bronchus	170
Colorectal	109
Childhood	72
Breast (female)	71
Cervix	43
Leukemia	38
Prostate	37
Kidney and renal pelvis	37
Ovary	36
Bladder	28
Non-Hodgkin lymphoma	22
Corpus & Uterus, NOS	15
Esophagus	9
Stomach	8
Pancreas	3
All other & unspecified	90

Source: South Dakota Department of Health
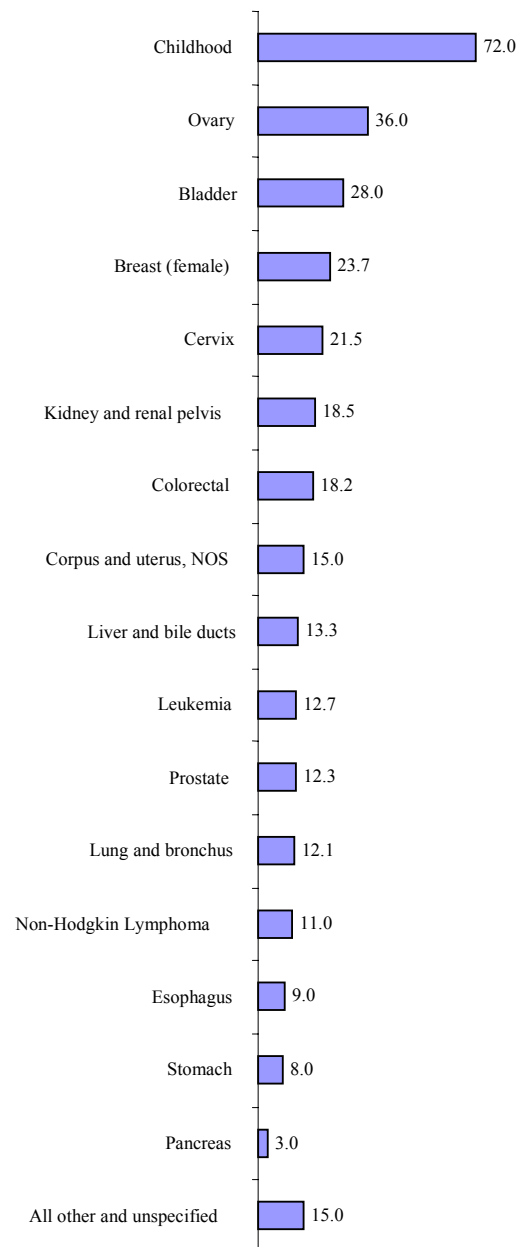
Average years of life lost

South Dakota's average years of life lost (AYLL) to cancer in 2001 was 12.7 years, seventh in rank after homicide, accident, suicide, cirrhosis, cardiovascular disease and septicemia. Childhood cancer ranked first among cancer sites in AYLL followed by cervix, larynx and thyroid. American Indians have a higher AYLL than whites for childhood cancer, 72 years compared to 61.3 for whites. AYLL for ovarian, bladder and female breast are higher than larynx, the next ranked AYLL for whites (Figures 13 and 14).

Figure 13: Average years of life lost for selected cancers among whites, South Dakota, 2001

Cancer	AYLL
Childhood	61.3
Larynx	23.3
Cervix	22.0
Thyroid	20.0
Melanoma (skin)	18.4
Brain and nervous system	18.3
Kidney and renal pelvis	17.5
Breast (Female)	17.2
Hodgkin Lymphoma	17.0
Oral cavity and pharynx	15.6
Liver and bile ducts	14.6
Stomach	13.7
Non-Hodgkin Lymphoma	12.9
Leukemia	12.9
Ovary	12.3
Myeloma	11.5
Lung and bronchus	11.4
Corpus and uterus, NOS	11.2
Pancreas	10.7
Colorectal	10.7
Esophagus	9.3
Bladder	7.8
Prostate	7.4
All other and unspecified	11.0

Source: South Dakota Department of Health

Figure 14: Average years of life lost for selected cancers among American Indians, South Dakota, 2001

Cancer	AYLL
Childhood	72.0
Ovary	36.0
Bladder	28.0
Breast (female)	23.7
Cervix	21.5
Kidney and renal pelvis	18.5
Colorectal	18.2
Corpus and uterus, NOS	15.0
Liver and bile ducts	13.3
Leukemia	12.7
Prostate	12.3
Lung and bronchus	12.1
Non-Hodgkin Lymphoma	11.0
Esophagus	9.0
Stomach	8.0
Pancreas	3.0
All other and unspecified	15.0

Source: South Dakota Department of Health

SELECTED CANCER SITES
INCIDENCE AND MORTALITY

Notes for this section

Primary sites were selected for this section and are summarized depending on:

- The importance of the cancers such as the top four common cancers: breast, colorectal, lung and bronchus and prostate.
- Whether the cancers showed some critical information such as the high number of cases for ovarian, pancreas, bladder and corpus uteri.

Some sites are presented in an abbreviated format.

ALL CANCER SITES
South Dakota, 2001
Incidence and Mortality Summary

	Total	Male	Female
Number of invasive cases	3481	1884	1597
Number of *in situ* cases	232	99	133
South Dakota incidence rate[+]	434.8	523.5	371.6
United States incidence rate*	468.8	552.9	410.5
Number of deaths	1598	889	709
South Dakota death rate[+]	190.7	251.2	148.5
United States death rate*	195.6	243.5	164.1
Healthy People 2010 Objective	159.9		

Rates are per 100,000 persons, age-adjusted to 2000 U.S standard pop.
Source: + South Dakota Department of Health
- *SEER Cancer Statistics Review 1975-2001*

Stage at diagnosis, all sites, 2001
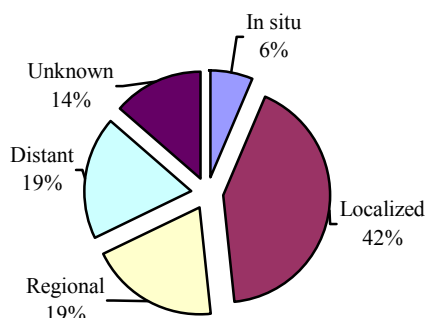
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Cancer is a very common disease, and even more so if all basal and squamous cell skin cancers and most *in situ* cancers are included in rates. Males have a higher incidence than females in most non-gender specific cancer types. One in two men and one in three women in South Dakota will develop cancer during their lifetime. The likelihood of being diagnosed with cancer increases with age with approximately 64 percent of cancers in South Dakota occurring among persons 65 years and older. However, the age at which cancer is most likely to occur depends on the type of cancer. Overall men are at greater risk of developing cancer and the incidence rate is about 30 percent higher than in women.

Stage at Diagnosis: Thirty-eight percent of South Dakotans were diagnosed at the late regional and distant stages.

Mortality: Cancer was the second leading cause of death in South Dakota. There were 67 cancer deaths among American Indians, or 15.4 percent of all American Indian deaths in 2001. The 2001 American Indian death rate was significantly higher than the 2001 American Indian national rate but not significantly different from the total and white South Dakota rates. For the five-year period 1997-2001, the South Dakota and white rates were significantly lower than the comparative national rates and the American Indian rates were statistically higher. South Dakota's age-adjusted death rate decreased during the five-year period 1997-2001 with an annual percent change (APC) of -0.4 for all sites, -0.3 for whites and -1.7 for American Indians. Overall the death/case ratio was 0.46 but would be lower if more cancers were reported.

Risk and Associated Risk Factors

Risk factors include tobacco use, obesity, diets high in fat and red meat and low in fruits and vegetables, occupational risk, sedentary lifestyle, infectious agents, prenatal and growth factors, reproductive factors, socio-economic status, alcohol use, environmental pollution, ultraviolet radiation, prescription drugs, medical procedures, and salt and other food contaminants.

Early Detection and Prevention

Cancers detected at an early stage are more likely to be cured but there are only a few types of cancers which have screening protocols that have been effective in reducing mortality among asymptomatic persons with average risks of developing the disease. Routine screening is recommended for female breast, cervix and colorectal cancers. The American Cancer Society (ACS) suggests that men age 50 and older should discuss prostate cancer with their doctors. Everyone should have a cancer related screening between ages 20-29 every three years, and annually after 40 years of age. Symptomatic persons should seek prompt care for an earlier diagnosis.

Recommendations are available from the ACS website: http://www.cancer.org or the National Cancer Institute Cancer Information Service website at http://cis.nci.nih.gov. These services also provide information on the early warning signs of some cancers. Prompt evaluation of symptoms may also lead to earlier diagnosis of cancer.
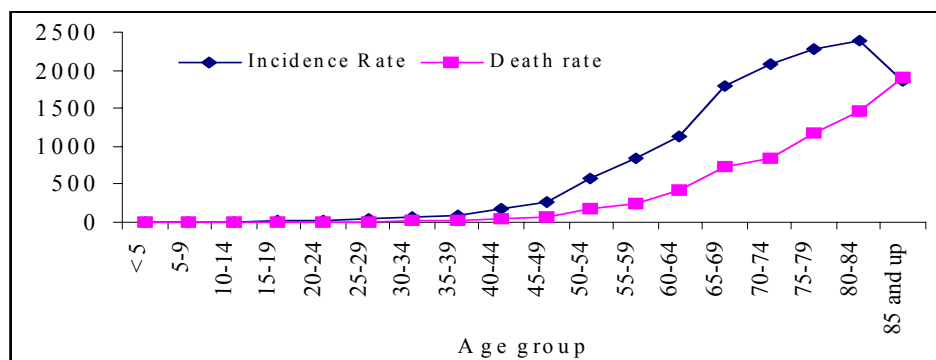
Figures 15 and 16 illustrate the impact of age on cancer cases, deaths, and rates. Age is the most important determinant of developing the disease.

Figure 15: All sites cancer cases and deaths by age groups in South Dakota, 2001
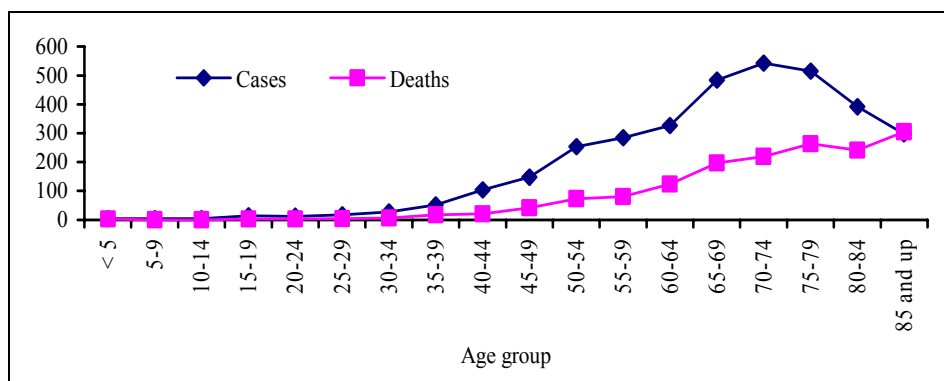
Source: South Dakota Department of Health

Figure 16: All sites age- specific incidence and mortality in South Dakota, 2001

Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 12: All sites age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	**White**	**American Indian**	**Total**	**White**	**American Indian**
South Dakota +	190.7	189.0	225.8▲	191.0▼	188.6▼	251.1▲
United States *	195.6	193.3	132.3	199.8	196.9	134.9

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
▲statistical significance higher than the U.S. rate   ▼statistical significance lower than the U.S. rate
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

BLADDER
South Dakota, 2001

Incidence and Mortality Summary

|	Total	Males	Females
Number of invasive cases	111	84	27
Number of *in situ* cases	70	52	18
South Dakota incidence rate[+]	21.4	38.7	8.9
United States incidence rate*	21.0	37.1	9.4
Number of deaths	36	26	11
South Dakota death rate[+]	4.0	7.1	1.8
United States death rate*	4.3	7.5	2.2

Rates are per 100,000 persons, age-adjusted to the 2000 U.S standard pop.
Rates include *in situ* cases.
Source: + South Dakota Department of Health
       * *SEER Cancer Statistics Review 1975-2001*

Bladder cancer stage at diagnosis
South Dakota, 2001

Unknown 15%
Distant 4%
Regional 7%
Localized 35%
In situ 39%

South Dakota Department of Health
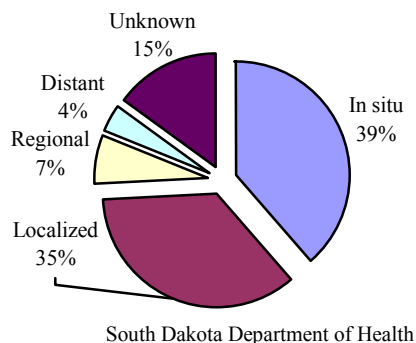
Descriptive Epidemiology

Incidence: Cancers of the urinary bladder were the fifth most frequent cancer with five percent of cancers reported. A total of 181 cases were observed, including 74 carcinoma *in situ* (CIS)[5] of the bladder, which are included to calculate rates. Only three cases of bladder cancer were observed among American Indians. Rates increased sharply with age, beginning at age 50. In 2001, incidence peaked among the 65-69 age-group. Men were affected three times as often as women.

Stage at diagnosis: Most cases were diagnosed at localized or *in situ* stages, when treatment yields better results than if diagnosed at later stages.

Mortality: The death rate for 2001 was similar to the national rate. For the five-year period 1997-2001, trends showed a decrease of a -0.5 statistically significant annual percent change (APC) for all races and decreases of -0.7 APC for whites and -0.2 APC for American Indians. The death to case ratio in 2001 was 0.2 for both sexes and males and a slightly higher 0.24 for females.
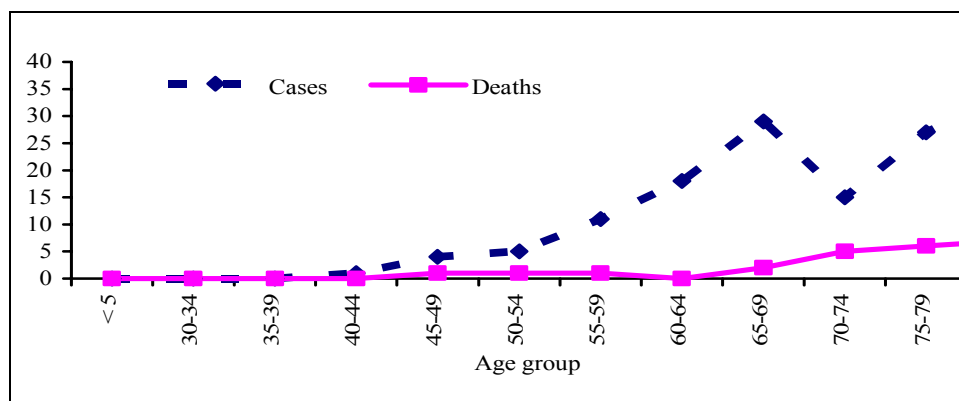
Risks and Associated Factors

Cigarette smoking accounts for 50 percent of bladder cancers in men and 25 percent in women with an average of 20 years between exposure and diagnosis. Associated risk factors include occupational exposure to aniline dyes, benzene or 2-napthalene, chronic infections such as *Schistosoma haematobium*, and calculus, and diets low in fruits and vegetables.

Early Detection and Prevention

There is no specific prevention except to stop smoking. Screening tests are neither available nor recommended for the general population.

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[5] CIS of the bladder is a highly malignant, aggressive neoplasm. It is a diffuse heterogeneous disease and prior to the use of the Bacillus-Calmette-Guerin (BCG) immunotherapy, 54 percent progressed to muscle invasive or metastasis within five years. Before medical advances leading to improved surgical procedures and immunotherapy, as high as 90 percent of CIS patients had tumor recurrence.

Figure 17: Bladder cancer cases and deaths by age in South Dakota, 2001

Source: South Dakota Department of Health

Figure 18: Bladder age-specific incidence and mortality in South Dakota, 2001
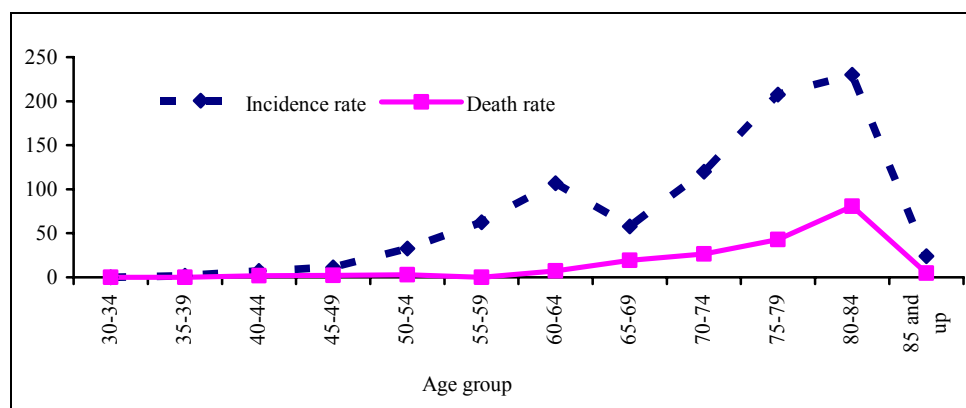
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 13: Bladder age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	**White**	**American Indian**	**Total**	**White**	**American Indian**
South Dakota +	4.0	4.0	2.3	3.7	3.7	2.1
United States *	4.3	4.5	1.8	4.4	4.5	1.5

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

BREAST (FEMALE)
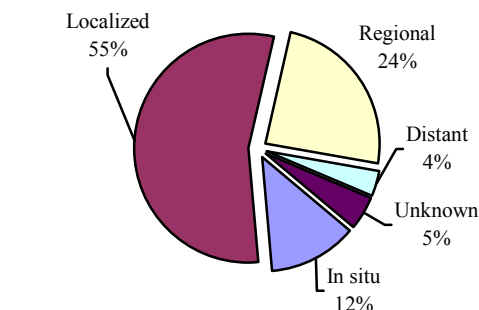## South Dakota, 2001

Incidence and Mortality Summary

	Females
Number of invasive cases	524
Number of *in situ* cases	74
South Dakota incidence rate[+]	128.5
United States incidence rate*	134.8
Number of deaths	88
South Dakota death rate[+]	19.2
United States death rate*	25.9
Healthy People 2010 Objective	**22.3**

Rates are per 100,000 persons, age-adjusted to the 2000 U.S. Standard population
Source: +South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

**Female breast cancer stage at diagnosis
South Dakota, 2001**

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Female breast cancer[6] is the leading cancer diagnosis for women and the second most common malignancy diagnosed in South Dakota with 524 invasive cases accounting for 15 percent of all cancer cases. Of that total 499 women were white and nine were American Indian. White women had an incidence rate three times that of American Indian women. Nineteen percent or 102 women were diagnosed with breast cancer before age 50 years accounting for the early peak in Figure 19 (page 35).

Stage at diagnosis: Sixty-seven percent of the diagnoses were at *in situ* and localized stages.

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[6] There were 6 cases of male breast cancer and 1 death in 2001.

None of the nine American Indian cases were diagnosed at distant stage.

Mortality: Breast cancer was the fifth most frequent cause of cancer deaths in South Dakota during 2001 with 88 deaths[7] and six percent of cancer deaths. Eighty-four of the death were white and four were American Indian, resulting in a higher age-adjusted mortality rate for American Indian women than for whites. However, the five-year trends in death rates show declining rates with an annual percent change (APC) of -1.4 percent for all races in South Dakota; -0.9 for whites and -4.0 for American Indian women. The death to case ratio was .15 for all women, .15 for whites and .2 for American Indian women.

Risk and Associated Factors

Known risk factors account for only 30 to 50 percent of breast cancers. Early onset of menarche, late onset of menopause, never being pregnant, first full term pregnancy after age 30 and fewer children increase risk because of cumulative exposure of breast tissue to estrogen. Other risk factors include high fat diets, obesity, alcohol consumption, history of fibrocystic disease, having a mother or sister with breast cancer, a history of ovarian cancer or endometrial cancer, and specific tumor suppressor genes such as BRCA1 and BRCA2. White women in high socioeconomic groups have increased risks.

Early Detection and Prevention

Early detection and treatment remain the only effective methods for preventing breast cancer deaths. Periodic mammograms and clinical breast examination by a trained health care professional offer substantial benefit in detecting tumors early in their development, when they are extremely small in size and without symptoms. Early diagnosis allows for more treatment options and improves overall survival and quality of life.
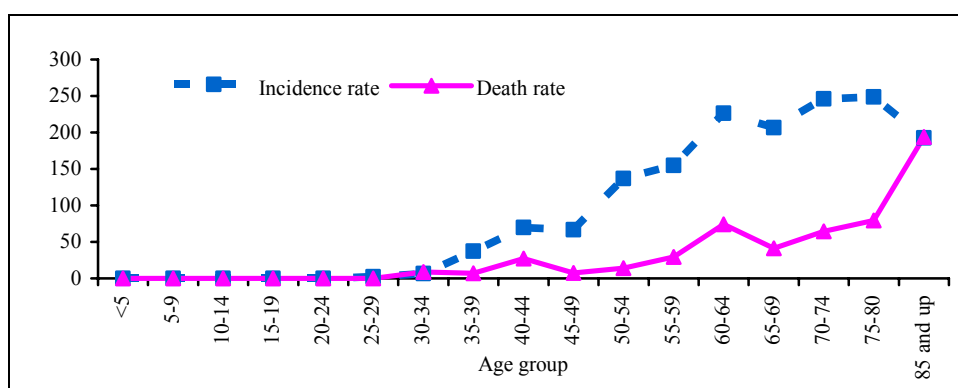
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[7] There were 129 deaths in 2000

Figure 19: Breast (female) cancer cases and deaths in South Dakota, 2001
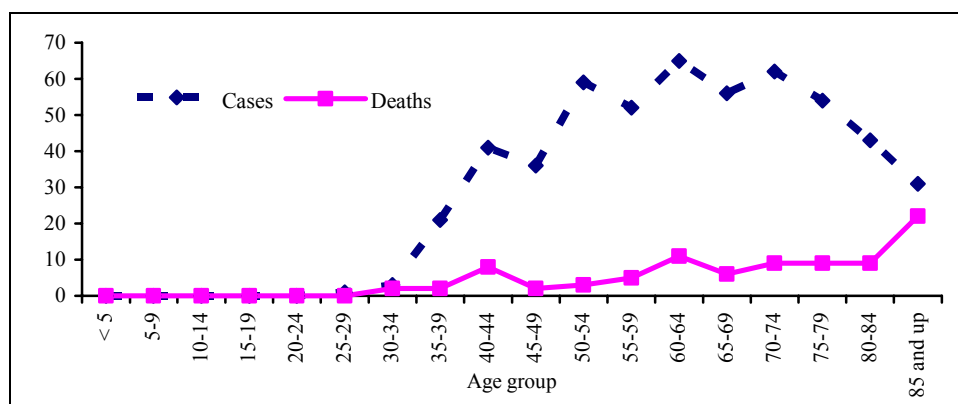
Source: South Dakota Department of Health

**Figure 20: Breast (female) age-specific cancer incidence and mortality
in South Dakota, 2001**

Source: South Dakota Department of Health

**Table 14: Breast (female) age-adjusted death rates by race in South Dakota and United States,
2001 and 1997-2001**

	2001			1997-2001		
	Total	**White**	**American Indian**	**Total**	**White**	**American Indian**
South Dakota +	19.2	19.2	22.1	23.3 ▼	23.5 ▼	18.5
United States *	25.9	25.4	11.9	27.0	26.4	13.6

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
▼ Statistical significance lower than the U.S. rate.
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

CERVIX UTERI
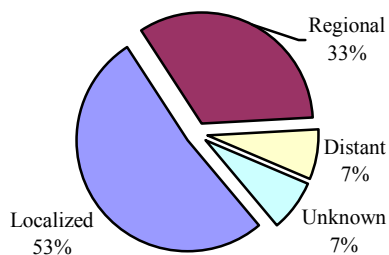## South Dakota, 2001

Incidence and Mortality Summary

	Females
Number of invasive cases	27
South Dakota incidence rate[+]	7.3
United States incidence rate*	7.9
Number of deaths	8
South Dakota death rate[+]	2.1
United States death rate*	2.7
Healthy People 2010 Objective	**2.0**

Rates are per 100,000 persons, age-adjusted to the 2001 U.S. standard
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2001*

Cervix uteri stage at diagnosis
South Dakota, 2001

Regional 33%
Distant 7%
Unknown 7%
Localized 53%

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Invasive cervical cancer accounted for approximately one percent of new cancer cases. There were 27 cases, of which 23 were white, 1 other race and 3 American Indian. The age-adjusted rate for American Indian women was twice that of the white and South Dakota rate. The median age for cervical cancer was one of the youngest with over 60 percent of cases under 50 years old. The SDCR does not collect carcinoma *in situ* (CIS) or cervical intraepithelial neoplasia (CIN III) of the cervix.

Stage at diagnosis: Only 53 percent of all cases were diagnosed at localized stages compared to 73 percent in 2000.

Mortality: Cervical cancer accounted for one percent of cancer deaths with a total of eight deaths, six white and two American Indian. The death rates for whites were lower than the

national rate. The mortality data showed American Indians with a six-fold rate when compared to whites and to the South Dakota totals for 2001 and for the five-year period 1997-2001. It was also 3.5 times the U.S. rate for American Indians. The most deaths occurred in the 60-64 and over 85 age groups. Overall the trend in the five-year mortality rate showed a decline with an average percent change (APC) of -0.1 percent for South Dakota and an increase for whites with an APC of 3.9. Death counts for American Indian rates have been too low to calculate trends. Deaths have been unstable ranging from 0 to 6 per year over the last decade.

The death to case ratio was 0.3 for all women in South Dakota, 0.26 for white women and 1.5 for American Indian women.

Risk and Associated Factors

Infection with Human Papilloma Virus (HPV) is a primary risk factor. Smoking, intercourse at an early age, multiple sexual partners, HIV, and other sexually transmitted diseases are known risk factors. Smoking is considered an associated risk factor.

Early Detection and Prevention

Regular use of Pap testing reduces deaths from cervical cancer. Women who have not been screened face a three-to 10-fold higher risk of developing invasive cervical cancer. Cure rates are nearly 100 percent when diagnosed at the pre-invasive stage. Screening should begin about three years after a woman begins having sexual intercourse or no later than 21 years old. Older, poor, less educated women and new immigrant women are less likely to be screened and are at a greater risk of dying.

Figure 21: Cervix uteri cancer cases and deaths in South Dakota, 2001
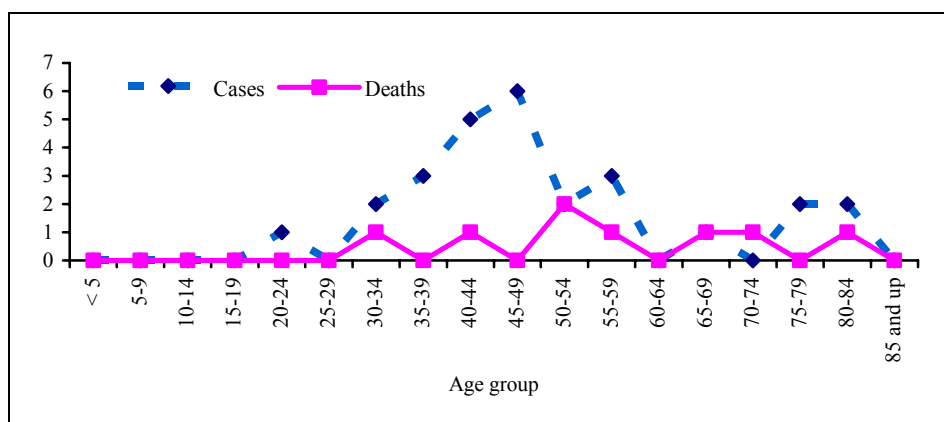
Source: South Dakota Department of Health

Figure 22: Cervix uteri age-specific incidence and mortality in South Dakota, 2001
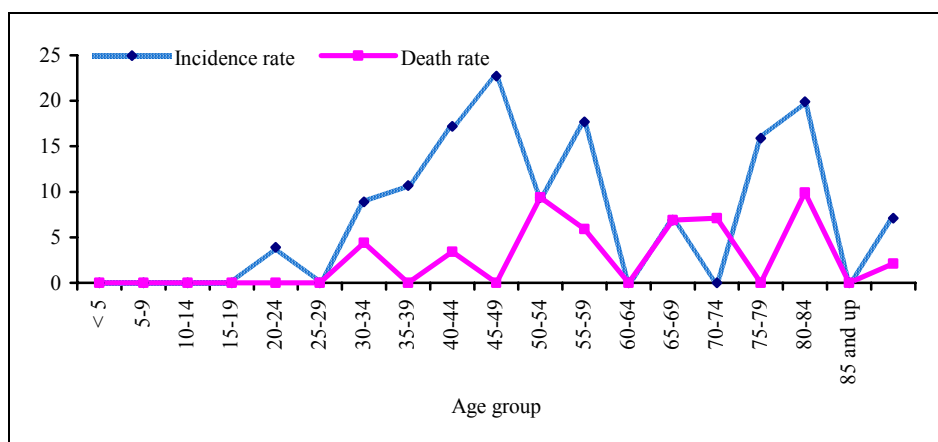
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 15: Cervix uteri age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	2.1	1.7▼	9.8	2.0	1.6▼	10.0▲
United States *	2.7	2.4	2.7	2.9	2.6	2.8

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population
▼ Statistical significance lower than the U.S. rate. ▲ Statistical significance higher than the U.S. rate
Source: + South Dakota Department of Health   * *SEER Cancer Statistics Review 1975-2001*
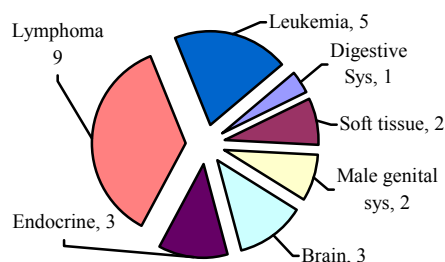
CHILDHOOD CANCERS (ages 0-19)
South Dakota, 2001

Incidence and mortality summary

	Total	Male	Female
Number of invasive cases	25	10	15
South Dakota incidence rate	11.0	8.6	13.0
United States incidence rate	16.2	17.2	15.1
Number of deaths	5	4	1
South Dakota death rate	2.2	3.3	1.0
United States death rate	2.8	3.0	2.6

Note: Rates are per 100,000, age-adjusted to the 2000 standard pop
Source: South Dakota Department of Health

**Childhood cancers by percentages,
South Dakota, 2001**

Source: South Dakota Department of Health

Descriptive Epidemiology

The types and distribution of childhood cancer differ notably from those occurring in adult populations. The International Association of Cancer Registries (IACR) has established a unique system for categorizing childhood cancers and this report follows that system. Whereas adult cancers are usually organized by site of the primary tumor, childhood cancers are classified according to their histology (microscopic identification of cells and tissue). The histological classification for childhood cancers is useful for the purposes of understanding the origins of the cancer and for identifying the best treatment.

Incidence: Generally, 14 cases per 100,000 children are expected nationally. In 2001, 25 cancers were reported to the SDCR for South Dakotans, ages 0-19. Trends in incidence for the United States show increases for all sexes and races. The SDCR cannot currently present incidence trend data. There are too few cases to meaningfully discuss differences in childhood cancer rates in the state.

Mortality: South Dakota's mortality rates are no different from the national rate. However, trends for 1997-2001 death rates for children less than 19 years old showed increases with an annual percent change of 3.1 for all races, 3.0 for whites and 3.3 for American Indians

Risk and Associated Risk Factors

Children who have been treated for one primary cancer are at increased risk of a second primary cancer later in life, i.e. a second primary cancer which is unrelated to the first cancer and not a result of the first cancer spreading or returning. Radiation and chemotherapies may increase the risk of subsequent primary cancers. Close monitoring of children for additional cancers is recommended after initial treatment for cancer. Each primary malignancy is counted as a separate cancer when calculating incidence rates, thus the total number of cancers can be greater than the total number of affected children. The increased risk of a second primary cancer persists into adulthood. Bone cancers appear during teenage years. Typically, the factors that trigger cancer in children are usually not the same factors that may cause cancer in adults, such as smoking or exposure to environmental toxins. Rarely, there may be an increased risk of childhood cancer in children who have a genetic condition, such as Down syndrome. In almost all cases, however, childhood cancers arise from non-inherited mutations (or changes) in the genes of growing cells. Because these errors occur randomly and unpredictably, there is currently no effective way to prevent them.

Early Detection and Prevention

Sometimes, a child's doctor may be able to spot early symptoms of childhood cancer at regular checkups. However, some of these symptoms (such as fever, swollen glands, frequent infections, anemia, or bruises) are also associated with other infections or conditions that are not cancer. Because of this, it is not uncommon for both doctors and parents to suspect other childhood illnesses when cancer symptoms first appear. Another reason is that cancer is relatively rare in children.

Table 16: Childhood cancer cases by age groups in South Dakota, 2001

	< 5	5-9	10-14	15-19	Total
Digestive system	0	0	0	1	1
Soft tissue (including heart)	1	0	1	0	2
Male genital system	0	0	0	2	2
Brain and other nervous system	0	1	1	1	3
Brain	0	1	1	1	3
Endocrine system	1	1	0	1	3
Thyroid	0	0	0	1	1
Lymphomas	0	1	1	7	9
Hodgkin lymphoma	0	0	1	5	6
Non-Hodgkin lymphoma	0	1	0	2	3
Leukemia	2	1	1	1	5
Acute lymphocytic	0	1	0	0	1
Acute myeloid	0	0	1	1	2
Chronic myelo-proliferative disorders	1	0	0	0	1
Total	4	4	4	13	25

Source: South Dakota Department of Health

Table 17: Childhood cancer deaths by age groups in South Dakota, 2001

	< 5	5-9	10-14	15-19	Total
Acute myeloid	0	0	0	1	1
Brain	0	0	0	1	1
Kidney and renal pelvis	1	0	0	0	1
Oral cavity(gum)	0	0	0	1	1
Retroperitoneum	1	0	0	0	0
Total	2	0	0	3	25

Source: South Dakota Department of Health

Table 18: Childhood cancer, age-adjusted death rates by race in South Dakota and the United States. 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	2.5	2.3	2.6	3.1	3.0	3.3
United States *	2.8	3.0	2.5	2.8	2.8	1.8

Note: Rates are per 100,000 persons, age –adjusted to the U.S. 2000 standard population
Source: + South Dakota Department of Health; * *SEER Cancer Statistic Review 1975-2001*

COLORECTAL
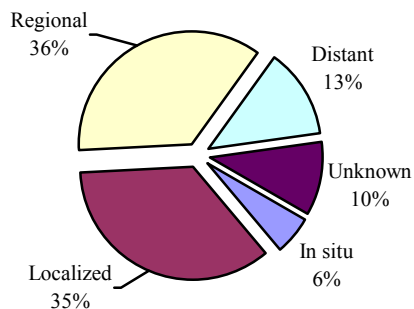## South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	443	227	216
Number of *in situ* cases	26	16	10
South Dakota incidence rate[+]	53.0	63.2	44.1
United States incidence rate*	51.2	60.6	44.8
Number of deaths	179	102	77
South Dakota death rate[+]	20.9	23.2	14.9
United States death rate*	20.0	24.2	17.0
Healthy People 2010 Objective	**13.9**		

Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2000

Colorectal cancer stage at diagnosis
South Dakota, 2001

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Colorectal cancer was the second leading cancer reported and accounted for 13 percent of new cases in 2001 with 443 cases. There were 403 cases among whites and 11 among American Indians. More males than females were diagnosed with colorectal cancer. Most cases occurred after age 50.

Stage at diagnosis: Almost 50 percent were diagnosed at the later stages, regional and distant. Fifty-four percent of both white and American Indians cases reported were at the later regional and distant stages.

Mortality: Colorectal cancer was the third leading cause of death with 13 percent of deaths due to cancer in 2001. Colorectal cancer deaths are decreasing in South Dakota with the 1997-2001 five-year trend in death rates of -0.6 annual percent change (APC). However, males had a positive APC of 2.6 and females have a -3.3 APC. By race, the white total was -1.0 APC, males were 1.9 and females were -3.6 APC. American Indians had an increase of 12.4 APC for both sexes, with a decrease of -1.2 APC for females and a statistically significant 36.5 for males. The death to case ratio was 0.4 for all races, 0.4 for whites and 0.8 for American Indians

Risk and Associated Factors

Risk factors include family or personal history, a history of irritable bowel disease or breast or reproductive cancers. Smoking, lack of physical activity, obesity and diets high in red meat and alcohol and low vegetable consumption contribute to increased risk. Aspirin use, calcium intake and hormone replacement therapy may reduce risk.

Early Detection and Prevention

Some studies have shown that the use of non-steroidal, anti-inflammatory drugs (NSAIDs) may be associated with a reduced risk of colorectal cancer and that the removal of polyps in the colon may also be associated with a reduced risk. Postmenopausal female hormone use is associated with a reduced risk of colon cancer but not rectal cancer. Colorectal cancer screening is recommended for all persons over 50 years, or earlier for persons at risk. Detecting cancers early lead to reducing mortality. Persons at high risk should talk with their physician for advice for earlier screening.

Figure 23: Colorectal cancer cases and deaths by age in South Dakota, 2001
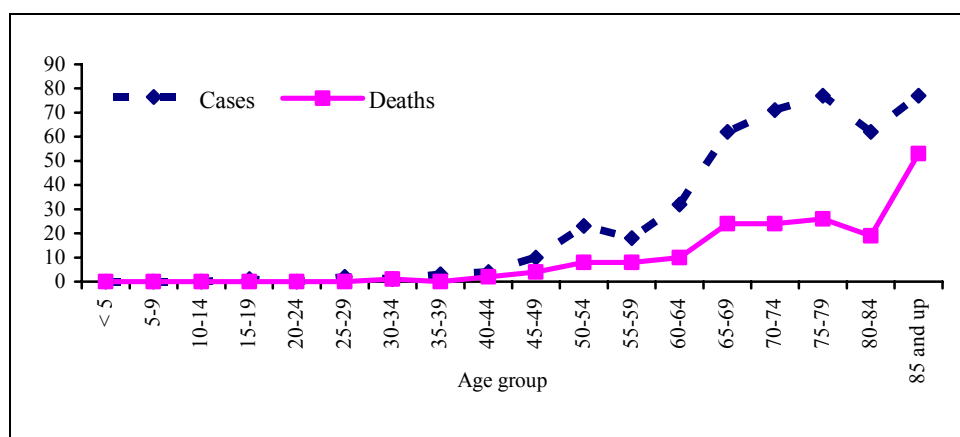
Source: South Dakota Department of Health

Figure 24: Colorectal age-specific cancer incidence and mortality, South Dakota, 2001
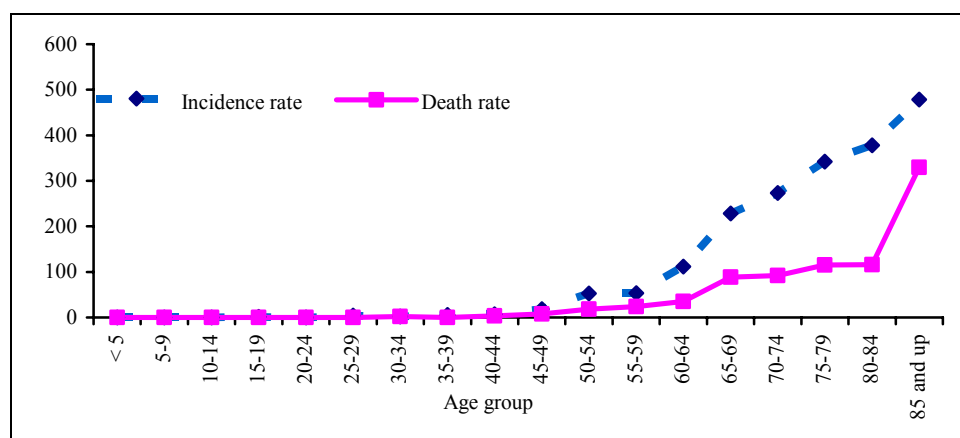
Notes: Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 19: Colorectal, age-adjusted death rates in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	20.9	20.5 ▲	31.9 ▲	22.7 ▲	22.6 ▲	23.5 ▲
United States *	20.0	19.5	12.3	20.8	20.3	13.9

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
▲ Statistical significant higher than the U.S rates.
Source: + South Dakota Department of Health   * *SEER Cancer Statistics Review 1975-2001*

CORPUS AND UTERUS, NOS
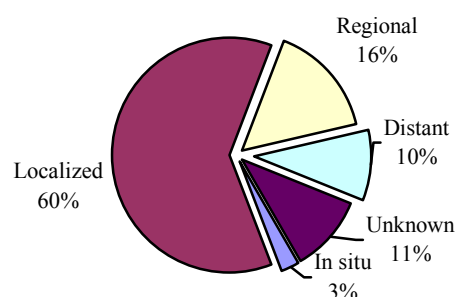## South Dakota, 2001

Incidence and Mortality Summary

	Females
Number of invasive cases	111
Number of *in situ* cases	3
South Dakota incidence rate[+]	26.4
United States incidence rate*	24.7
Number of deaths	34
South Dakota death rate[+]	6.6
United States death rate*	6.9

Rates are per 100,000 person, age-adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2001*

Corpus and uterus, NOS stage at diagnosis
South Dakota, 2001

Regional 16%
Distant 10%
Localized 60%
Unknown 11%
In situ 3%

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Cancer of the uterus, sometimes referred to as endometrial cancer, is the most common gynecologic cancer in South Dakota. It accounted for 2.0 percent cases of cancer cases reported. Of the 111 cases reported, only five were identified as American Indian, resulting in an age-adjusted incidence rate no different from the South Dakota total or the white rate. More than half the cases occurred in women over 40.

Stage at diagnosis: Most cases in South Dakota were diagnosed at the localized stage. At the regional stage, survival is 65 percent.

Mortality: Deaths accounted for three percent of all cancer deaths, much higher than the 0.5 percent in 2001. Of the 34 women who died from this cancer in 2001, only three were

American Indians, resulting in an age-adjusted death rate three times the white and total South Dakota rates. The 2001 and 1997-2001 death rates for American Indians were statistically significant when compared to the United States rates. Trends in the death rate show an increase over the five-year period 1997-2001 with an annual percent change (APC) of 15.6 percent for all races and 12.0 APC for white women. Counts were too low to calculate an APC for American Indian women. The death to case ratio was .31 for all women.

Risk and Associated Factors

Chronic exposure to estrogen over a lifetime increases risk. Factors such as tamoxifen therapy for breast cancer, diabetes mellitus and hypertension, few or no children, genetic predisposition, and previous cancer of the breast, colon or ovary, are associated with increased risks.

Note: The risk of developing uterine cancer is actually higher than the rates reported because the denominator used to calculate the rates are all women. Only women with a uterus can develop uterine cancer and since the number of women without a uterus is unknown, the denominator is higher than it should be, resulting in a lower rate.

Early Detection and Prevention

There is no equivalent screening test for endometrial cancer as the Pap smear and its essential role in screening for cervical cancer. Possible signs of endometrial cancer include unusual vaginal discharge or pain in the pelvis. A woman should see her doctor if any of the following problems occur:

- Bleeding or discharge not related to menstruation (periods).
- Difficult or painful urination.
- Pain during sexual intercourse.
- Pain in the pelvic area.

To diagnose endometrial cancer, a sample of endometrial tissue must be removed using endometrial biopsy or by dilatation and curettage.

Figure 25: Corpus and uterus NOS cases and deaths by age in South Dakota, 2001
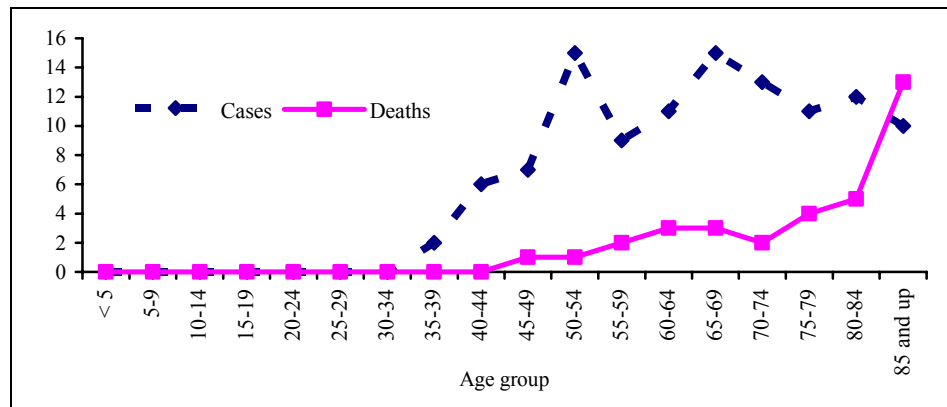
Source: South Dakota Department of Health

Figure 26: Corpus and uterus NOS age-specific incidence and mortality, South Dakota, 2001
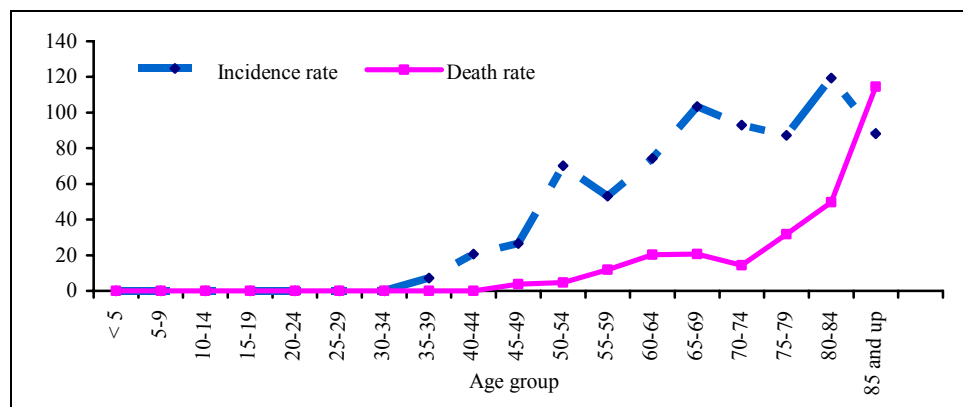
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 20: Corpus and uterus NOS age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	6.6	5.9	22.3 ▲	4.0	3.8	9.1 ▲
United States *	4.2	3.9	2.8.	4.1	3.9	2.3

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
▲ Statistical significance higher than the national rate.
Source: + South Dakota Department of Health * *SEER Cancer Statistics Review 1975-2001*

KIDNEY AND RENAL PELVIS
South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	92	57	35
Number of *in situ* cases	1	1	0
South Dakota incidence rate[+]	11.5	15.8	7.9
United States incidence rate*	12.1	16.9	8.3
Number of deaths	44	28	16
South Dakota death rate[+]	5.2	8.0	3.3
United States death rate*	4.2	4.2	4.3

Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2001*

Kidney and renal pelvis cancer stage at diagnosis; South Dakota, 2001

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: In 2001, kidney and renal pelvic cancers were the ninth leading cancer reported to the SDCR with three percent of observed cases. All ages are at risk for these cancers with men af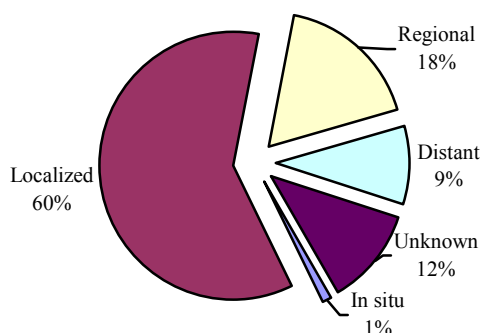fected twice as often as women. Most cases occur in older people except for Wilm's tumor (nephroblastoma), which affects mostly children under five and accounts for the majority of childhood kidney cancers. Only one childhood kidney cancer was reported. Of the 93 cases observed, six were American Indians. Renal cell carcinomas are 80 percent of adult kidney cancers.

Stage at Diagnosis: Almost two-thirds of all cases were diagnosed at the localized stage for all races and whites while half of American Indian cases were.

Mortality: This cancer was the twelfth leading cause of cancer death, accounting for three percent of all cancer deaths. Mortality rates were twice as high for men as for women. South Dakota's five-year rate decreased slightly at -0.3 annual percent change (APC) and -0.9 APC for whites. Counts for American Indians were too low to analyze. There were no significant differences among rates for whites and American Indians when compared with each other and with the national rate in 2001 and for 1997-2001.

Risk and Associated Factors

Tobacco use is strongly associated with adult kidney cancer. Obesity is positively associated as well as occupational exposure to aniline dyes, benzene or 2-napthalene. Approximately one percent of cases cluster in families.

Early Detection and Prevention

Since it is difficult to diagnose renal cancer until it becomes symptomatic many cases are diagnosed at later stages when treatment is more difficult. Symptoms include sporadic blood in the urine and sometimes pain at the point where approximately one-third would have already metastasized. The only preventive measure is for adults to quit smoking.

Figure 27: Kidney and renal pelvis cases and deaths by age in South Dakota, 2001
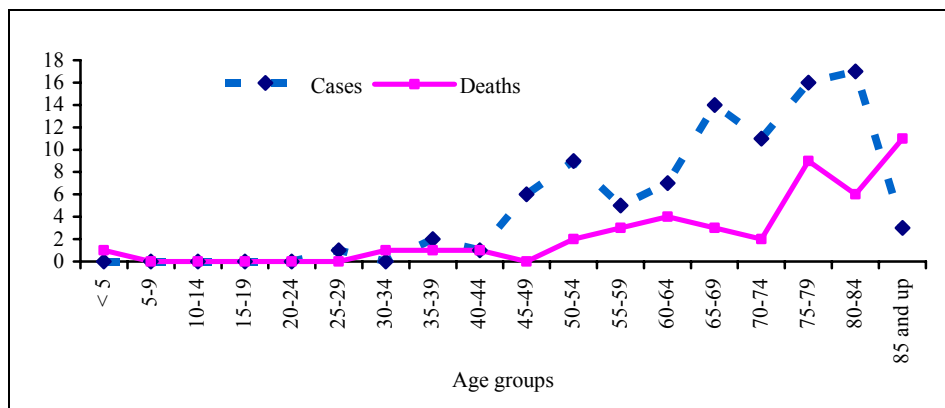
Source: South Dakota Department of Health

Figure 28: Kidney and renal pelvis age-specific incidence and mortality by age in South Dakota, 2001
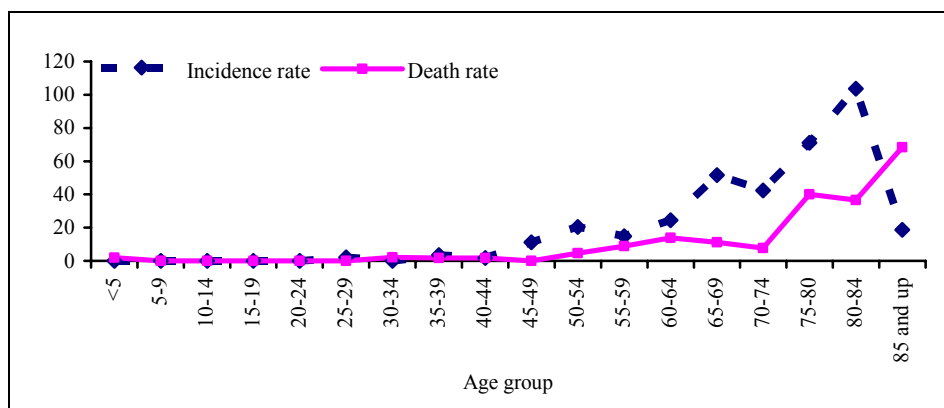
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 21: Kidney and renal pelvis age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	5.2	5.2	6.1	4.5	4.5	5.1
United States *	4.3	4.3	4.9	4.2	4.3	4.7

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

LUNG AND BRONCHUS
South Dakota, 2001
Incidence and Mortality Summary

	Total	Males	Females
Number of cases	425	265	160
Number of *in situ* cases	0	0	0
South Dakota incidence rate[+]	53.2	73.2	37.3
United States incidence rate*	61.2	77.7	49.1
Number of deaths	414	264	150
South Dakota death rate[+]	50.7	73.7	33.3
United States death rate*	55.2	75.1	40.9
Health People 2010			
Objective	**44.9**		

Rates are per 100,000 persons age adjusted to the 2000 U.S. standard population
Source: + South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Lung and bronchus cancer stage at diagnosis
South Dakota, 2001

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Lung and bronchus cancer cases were the leading non-gender specific cancer reported during 2001 at 12 percent of cases reported. By race, 400 whites and 20 American Indians were diagnosed with lung and bronchus cancer. The age-adjusted incidence rate among American Indians, 70.3, was 25 percent higher than the white rate of 50.3 cases per 100,000 persons. Lung cancer incidence rates increased with age. More males than females were diagnosed.

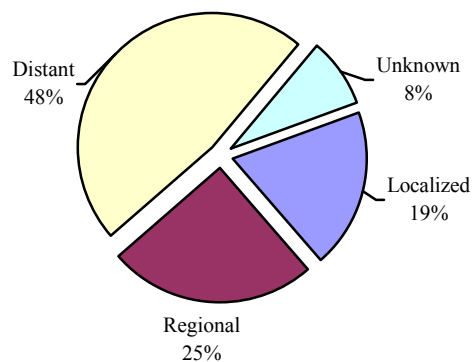*Stage at diagnosis:* Lung cancer is usually diagnosed at late stages when symptoms appear. In South Dakota in 2001, 48 percent of total cases, 49 percent of white cases and 35 percent of American Indian cases were diagnosed at distant stages.

Mortality: There were 403 deaths among whites and 20 among American Indians. When the two rates are compared, the American Indian rate is quite high but not statistically significant. The white and American Indians rates for 2001 and 1997-2001 were statistically significant when compared to the United States. rates. For the five-year period 1997-2001, the trend for death rates for South Dakota showed an increase for all races with an annual percent change (APC) of 0.7; an increase for whites with an APC of 0.9; and a decrease for American Indians with a -3.0 APC. The trends by sex showed decreases for all males by race and increases for females. The death to case ratio in 2001 in South Dakota was 0.95 for all races; 0.98 for whites and 0.87 for American Indians.

Risk and Associated Factors

Cigarette smoking, including exposure to second hand smoke, is the most important risk factor accounting for 68 to 78 percent of lung cancer deaths among females and 88 to 91 percent among males. Occupational or environmental exposures such as radon, asbestos, coal tars, crystalline silica and polycyclic aromatic hydrocarbons increase risk. One to two percent of lung cancer deaths are attributable to air pollution.

Early Detection and Prevention

There are no recommendations for screening. Early detection of lung cancer is difficult because symptoms usually do not appear until the disease is advanced. The best prevention is to quit smoking. Smoking is responsible for 66 percent of lung cancers. Treatment options may involve a combination of surgery, radiation and chemotherapy because of late stage diagnoses.

Figure 29: Lung and bronchus cases and deaths by age in South Dakota, 2001
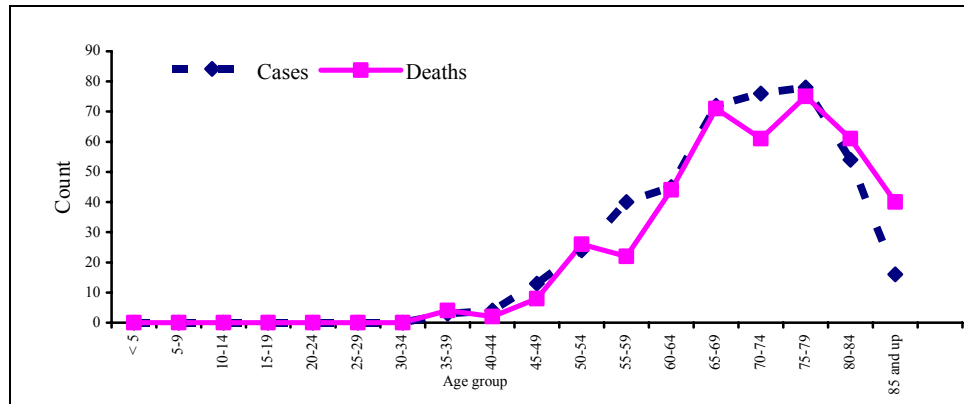
Source: South Dakota Department of Health

Figure 30: Lung and bronchus age-specific incidence and mortality rates in South Dakota, 2001
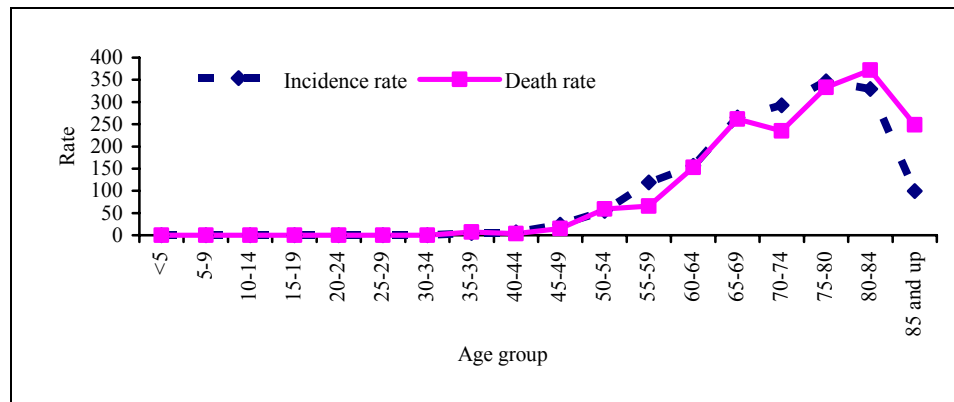
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 22: Lung and bronchus age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	**White**	**American Indian**	**Total**	**White**	**American Indian**
South Dakota +	50.7	50.2 ▼	61.4 ▲	48.2 ▼	47.1 ▼	83.4 ▲
United States *	55.2	55.5	34.7	56.2	56.2	36.3

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
▼ Statistical significance lower than the national rate.   ▲ Statistical significance higher than the national rate
Source: + South Dakota Department of Health;   * *SEER Cancer Statistics Review 1975-2001*

LEUKEMIA
South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	99	61	38
South Dakota incidence[+]	12.2	17.2	8.6
United States incidence*	12.2	16.0	9.5
Number of deaths	72	42	30
South Dakota mortality[+]	8.4	11.3	5.8
United States mortality*	7.6	10.3	5.9

Rates are per 100,000 persons, age adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
*SEER Cancer Statistics Review 1975-2001

Leukemia stage at diagnosis
South Dakota, 2001

Leukemias are not staged because they involve bone marrow throughout the body and often have spread to other organs. Doctors classify them by type and subtype in an attempt to determine the prognosis and a recommended level of treatment. Chronic myelogenous leukemia is grouped by phases and chronic lymphocytic leukemia (CLL) uses a Rai classification

Descriptive Epidemiology

Incidence: Leukemias are a diverse group of cancers and are sub-typed by histology. Subtypes have different etiology, treatment and prognosis. Leukemias accounted for five percent of all cases reported to the SDCR. The most common types reported were chronic lymphocytic leukemia and acute myeloid.

Leukemias are most likely under reported to the SDCR because cases might be diagnosed and treated in physician's offices or out of state. Therefore, the data should be used with caution.

Leukemia is a common childhood cancer with five cases reported in 2001 in children less than 19 years old. Children under 19 have a higher incidence than those ages 20-34 years and incidence increases with age over 35 years old. The most cases reported were among adults 70-74 years old.

Mortality: Leukemia accounted for three percent of cancer deaths with acute myeloid leukemia being the most frequent cause of leukemia deaths. Whites had higher death rates than American Indians for leukemias both in South Dakota and nationally. Trends in death rates for the five years 1997-2001 for leukemias showed a slight decrease with an annual percent change (APC) of -0.6 for all races and -0.8 for whites. Deaths for American Indians were too low for meaningful data.

Risks and Associated Risk Factors

Causes for most of these cancers are unknown. Occupational exposures to benzene and radiation, certain chromosomal abnormalities, such as Down syndrome, human T-cell lymphocytic virus type I (HTLV-I) and cigarette smoking may be associated with leukemias. Childhood leukemias in the early years may be related to genetic factors and certain prenatal and post-natal exposures.

Early Detection and Prevention

There are no early detection or prevention strategies. Often symptoms are the same as for many other health problems, thus early detection is difficult. Diagnosis is made using blood tests and bone marrow biopsies.

Table 24: Leukemia age-adjusted death rates South Dakota and United States, 2001

	Total	White	American Indian
South Dakota+	8.4	8.0	15.5
United States*	7.6	7.8	3.7

Note: Rates are age adjusted per 100,000 persons to 2000 U.S standard
Source: + South Dakota Department of Health
        * SEER Cancer Statistics Review 1975-2001

Table 24: Leukemia age-adjusted death rates South Dakota and United States, 1997-2001

	Total	White	American Indian
South Dakota	8.4	8.4	6.1
United States	7.6	7.8	3.9

Note: Rates are age adjusted per 100,000 persons to 2000 U.S standard population
Source: + South Dakota Department of Health
  • *SEER Cancer Statistics Review 1975-2001*

MELANOMA (SKIN)
South Dakota, 2001

ncidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	91	45	46
Number of *in situ* cases	34	20	14
South Dakota incidence rate[+]	8.8	10.3	8.1
United States incidence rate*	17.7	22.5	14.4
Number of deaths	25	17	8
South Dakota death rate[+]	3.1	4.7	2.1
United States death rate*	2.7	3.9	1.7
Healthy People 2010 Objective	**2.5**		

Rates are per 100,000 persons age adjusted to the 2001 U.S. standard population
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Melanoma stage at diagnosis
South Dakota, 2001

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Invasive melanoma of the skin accounted for three percent of the cancers reported to the SDCR. Cases were under reported by about 60 percent of the estimated 200 cases for 2001, therefore the incidence rate should be used with caution. Melanoma incidence increases with age and is generally higher among men than women. Melanoma is primarily a cancer of white populations and ethnic background is determinant among this population.

Stage at diagnosis: Sixty-eight percent were diagnosed at early in situ and localized stages.
Mortality: Deaths were two percent of cancer deaths. The five-year trend in mortality rates from 1997-2001 decreased with an annual percent change (APC) of -0.9 percent.

Risk and Associated Factors

Fair skin or complexion, history of sunburns and/or exposure to ultraviolet light (both sun and artificial UV light), and multiple dark moles are the highest risk factors. A history of three or more sunburns, particularly blistering sunburns, from either sun exposure or tanning booths before age 20 greatly increases risk. Individuals with a prior history or family history of melanoma are also at risk. Immuno-suppressed persons also have increased risk.

Early Detection and Prevention

The best way to identify early melanoma is through the recognition of changes in skin growth such as moles or appearance of new growths. Skin examinations should be part of regular checkups and people at risk should be using the ABCD rule.

> **ABCD Rule**
> **A**symmetry-one half of the mole does not match the other;
> **B**order irregularity-edges are ragged or notched;
> **C**olor pigmentation not uniform; and
> **D**iameter more than 6 millimeter

Table 25: Melanoma age-adjusted death rates, South Dakota and United States, 2001

	Total	White	American Indian
South Dakota[+]	3.1	3.3	0.0
United States*	2.7	3.0	0.7

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population .
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Table 26: Melanoma age-adjusted death rates, South Dakota and U. S., 1997-2001

	Total	White	American Indian
South Dakota[+]	2.6	2.8	0.0
United States*	2.7	3.0	0.5

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
**SEER *Cancer Statistics Review* 1975-2001

MYELOMA[§]
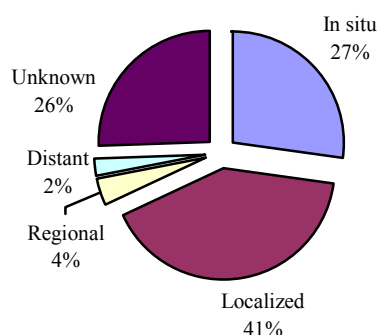## South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	37	25	12
Number of *in situ* cases	0	0	0
South Dakota incidence rate[+]	4.6	7.0	2.8
United States incidence rate*	5.5	6.8	4.5
Number of deaths	31	14	8
South Dakota death rate[+]	3.7	4.0	3.8
United States death rate*	3.8	4.7	3.3

§ includes NOS, multiple, plasma cell and solitary
Rates are per 100,000 persons, age-adjusted to the 2001 U.S. standard population
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2000*

Myeloma stage at diagnosis
South Dakota, 2001
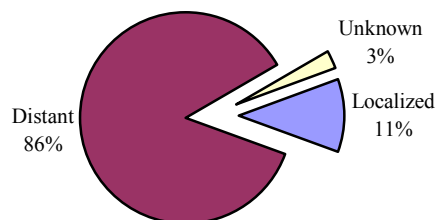
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Myeloma is a malignancy of plasma cells and can proliferate throughout the body. Plasma cell disorders are somewhat uncommon. Myeloma accounts for approximately one percent of cancers in both South Dakota and the United States. Myelomas may be under reported in South Dakota. It is rare in persons under 50 years old and affects males more than females. In South Dakota, whites are afflicted more than minorities.

Stage at diagnosis: Most of the cases reported were at distant stage as this disease diffuses through the body.

Mortality: Myeloma accounted for two percent of cancer deaths. There was no difference between the male and female death rates. Whites had high death rates because the disease afflicts them more than other races. However, trends in death rates for 1997-2001 showed a statistically significant decrease in annual percent change (APC) for all South Dakotans, a decline for whites with -0.4 APC and an increase for American Indians with 3.1 APC.

Risk and Associated Factors

The etiology of this cancer is relatively unknown. There is little evidence of the role of exposure to toxic substances, and ionizing radiation. Some viruses are thought to be associated with myeloma. There could also be a possible familial role and auto-immune conditions and chronic immune stimulation may increase risk.

Early Detection and Prevention

There is no known test for early detection. It is very difficult to diagnose. The presence of plasma cells and proteinuria do not automatically lead to myeloma. It is often asymptomatic in its early stages. Diagnosis involves the presence of M protein in serum and urine, and 30 percent plasma cells in the bone marrow. Estimating tumor burden is critical in staging and determining if multiple myeloma is present.

Table 27: Myeloma age-adjusted death rates, South Dakota and United States, 2001

	Total	White	American Indian
South Dakota	3.7	3.9	0.0
United States	3.8	3.5	3.2

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard.
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Table 28: Myeloma age-adjusted death rates, South Dakota and United States, 1997-2001

	Total	White	American Indian
South Dakota	4.1	4.1	5.1
United States	3.8	3.5	3.0

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard.
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

NON-HODGKIN LYMPHOMA
South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	116	57	59
South Dakota incidence rate[+]	14.5	15.8	13.5
United States incidence rate*	19.0	23.1	15.6
Number of deaths	83	42	41
South Dakota death rate[+]	9.7	11.8▲	7.9
United States death rate*	7.9	9.9	6.4

Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard population

▲ Statistical significance higher than the U.S. rate.

+ Source: South Dakota Department of Health

* *SEER Cancer Statistics Review 1975-2000*

Non-Hodgkin lymphoma stage at diagnosis
South Dakota, 2001
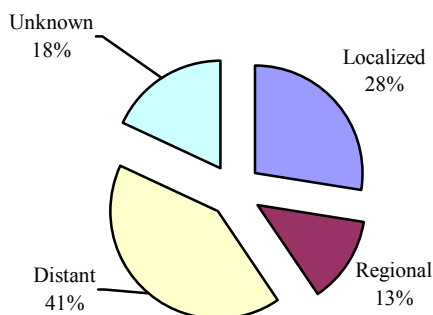
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Lymphomas are malignancies of white blood cells and are typed either Hodgkin or the more common non-Hodgkin lymphoma (NHL). Eighty percent of the lymphomas reported to the SDCR in 2001 were NHL. It was the sixth leading cancer reported to the SDCR with three percent of new cases. There is a steep rise in cases as the population ages. The American Cancer Society estimated 200 new cases of NHL for South Dakota in 2001, therefore NHL was under reported and the incidence data should be used with caution

Mortality: NHL was the sixth leading cause of death by cancer with five percent of cancer deaths. In 2001 males had a significantly higher rate in South Dakota when compared to the rest of the nation. Age-adjusted death rates from 1997-2001 for all white, white males and the total population in South Dakota were significantly higher compared to national rates. American Indians in South Dakota had the same rates as American Indians nationally. The five-year trends in death rates from 1997-2001 showed a decline with a statistically significant annual percent change (APC) of -3.0 for all South Dakotans; a statistically significant decline with a -2.9 APC for whites; and an increase for American Indians with a 2.9 APC.

Risk and Associated Factors

There are no known risk factors. Immuno-suppressants increase the risk of NHL. HIV and other viruses, exposures to ethylene oxide and other chemicals in solvents, and pesticides or fertilizers are associated risk factors.

Early Detection/Prevention

There are no established tests to detect NHL early on a wide scale. It is usually diagnosed after patients present with signs and symptoms referable to lymphadenopathy.

Table 29: Non-Hodgkin lymphoma age-adjusted death rates, South Dakota and United States, 2001

	Total	White	American Indian
South Dakota	9.7	9.8	5.7
United States	7.9	8.2	5.5

Note: Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard population

+ Source: South Dakota Department of Health

* *SEER Cancer Statistics Review 1975-2000*

Table 30: Non-Hodgkin lymphoma age-adjusted death rates, South Dakota and United States, 1997-2001

|	Total	White	American Indian
South Dakota	10.4▲	10.5▲	5.6
United States	8.4	8.7	5.0

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population

▲ Statistical significance higher than the U.S. rate.

+ Source: South Dakota Department of Health

* *SEER Cancer Statistics Review 1975-2001*

ORAL CAVITY AND PHARYNX
South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	65	45	20
Number of *in situ* cases	3	2	1
South Dakota incidence rate[+]	8.4	12.7	4.9
United States incidence rate*	10.4	15.0	6.6
Number of deaths	20	10	10
South Dakota death rate[+]	2.3	2.7	2.0
United States death rate*	2.8	4.1	1.6
Healthy People 2010 Objective	**2.7**		

Rates are per 100,000 persons age adjusted to the 2000 U.S. standard
population
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2000

Oral cavity & pharynx cancer stage at diagnosis South Dakota, 2001

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Oral and pharyngeal cancers comprise a variety of malignant tumors and are overwhelmingly squamous cell carcinomas. Oral cavity and pharynx cancers were the tenth most common cancer reported to the SDCR accounting for 2.3 percent of cancer cases reported. Age plays a definite role in this cancer as the peak age at diagnosis was 50 to 74 years. Males had higher incidence and mortality rates. Rates among American Indians were twice as high as those for whites in South Dakota and when compared to all races nationally.

Stage at diagnosis: Approximately half of the cases were diagnosed at localized stage.

Mortality: Oral-pharyngeal cancer was the sixteenth cause of cancer death at 1.3 percent. Death rates were not significant when compared to national rates. The annual percent change (APC) for the period 1997-2000 was -2.7 showing a decline in mortality. South Dakota has met the Healthy People 2010 goal of 2.7 for the same period with a rate of 2.6. However, looking at the American Indian rate, the disparity is clear. Reducing the American Indian mortality rate would help in reducing disparities and South Dakota's rate even lower than it is and at the same time, reduce the overall cancer burden.

Risk and Associated Factors

Cigarette, cigar or pipe smoking and use of smokeless and spit tobacco along with excessive consumption of alcohol are major risk factors. Nearly 75 percent of cases are associated with tobacco use. Combined exposure with alcohol substantially increases risk and accounts for 90 percent of cases. Diets low in fruits and vegetables are also associated with risk and rates are higher among minorities and lower income groups.

Early Detection and Prevention

The single most effective measure to lower risk of developing this cancer is to reduce exposure to tobacco and alcohol. Most cases of oral cavity and pharynx cancers are preventable

Figure 31: Oral cavity and pharynx cancer cases and deaths in South Dakota, 2001
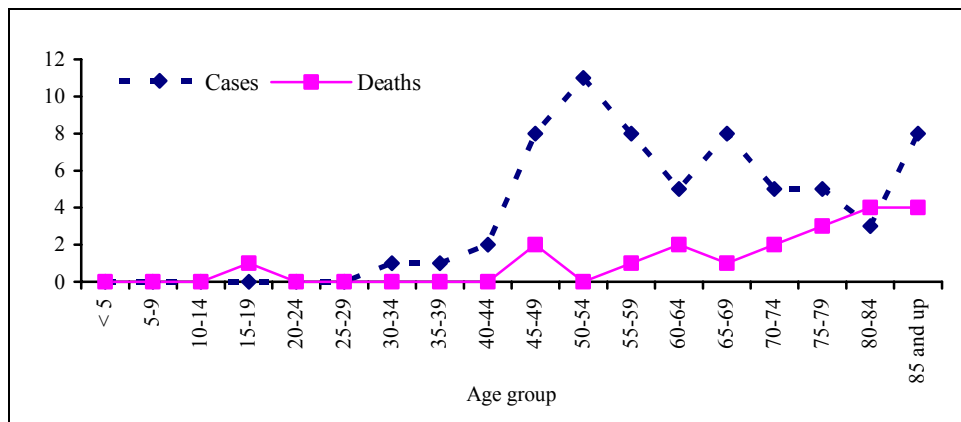
Source: South Dakota Department of Health

Figure 32: Oral cavity and pharynx age-specific incidence and mortality in South Dakota, 2001
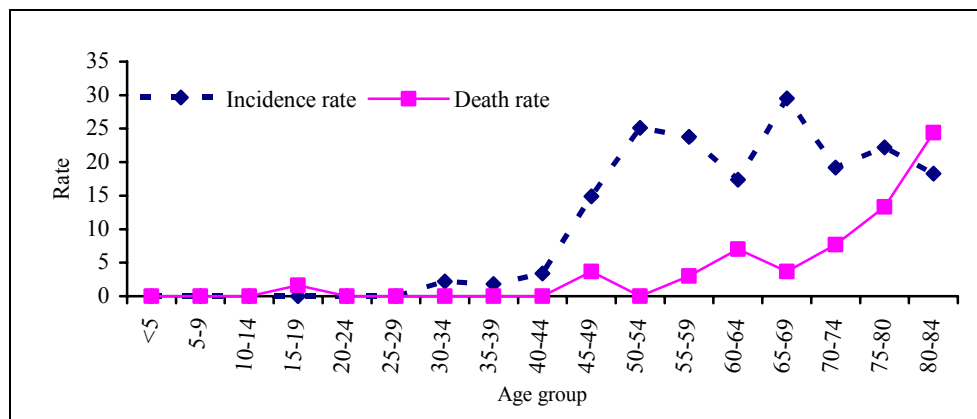
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 31: Oral cavity and pharynx age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	2.3	2.3	0	2.5	2.4	4.2
United States *	2.7	2.6	2.1	2.8	2.6	2.3

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2000*

OVARY
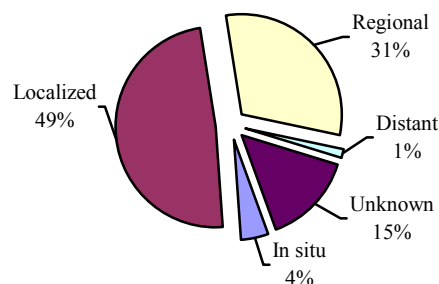## South Dakota, 2001

Incidence and Mortality Summary

	Females
Number of invasive cases	54
Number of *in situ* cases	0
South Dakota incidence rate[+]	12.7
United States incidence rate*	13.6
Number of deaths	47
South Dakota death rate[+]	10.1
United States death rate*	9.0

Rates are per 100,000 persons, age-adjusted to the 2000 standard population
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2001*

Ovarian cancer stage at diagnosis
South Dakota, 2001
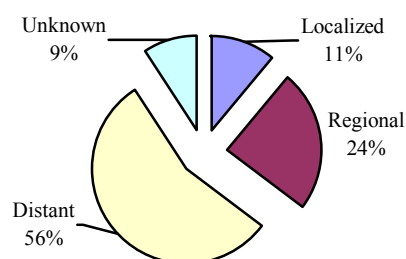
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Ovarian cancer accounted for two percent of the cases reported to the central registry. Of these, only one was American Indian and 45 were white women. About one in every 57 women will get ovarian cancer. Most cases were women over the age of 50, but this disease can also affect younger women.

Stage at diagnosis: Over half of the ovarian cancer cases were diagnosed at distant stage and approximately one-quarter at regional stage. There are no early detection tests and by the time symptoms appear the cancer has already progressed.

Mortality: Ovarian cancer accounted for three percent of cancer deaths. Death rates started climbing at age 40 but there were a few small peaks at 20-24 and 30-39 age groups. The mortality rates for all sites and by race for 2001 and 1997-2001 were not significantly different from the national rates. The five-year trend for mortality rates showed an increase during the period 1997-2001 with an annual percent change (APC) of -0.1 for all races, -0.5 APC for white women and -4.0 for America Indian women. The death to case ratio in 2001 was 1.26, which is due to the high number of cases being diagnosed at distant stages.

Risk and Associated Factors

Family history of a first degree relative with ovarian cancer is the most important risk factor. Fertility drugs, hormone replacement therapy, history of breast or colon cancer, no childbearing history and early menarche also increase risk.

Early Detection and Prevention

Ovarian cancer is difficult to detect early. Many times, women with ovarian cancer have no symptoms or just mild symptoms until the disease is in an advanced stage. Scientists are studying ways to detect ovarian cancer before symptoms develop such as transvaginal ultrasound or the usefulness of measuring the level of the tumor marker, CA 125. The marker is often found in higher-than-normal amounts in the blood of women with ovarian cancer.

Figure 33: Ovary cancer cases and deaths in South Dakota, 2001
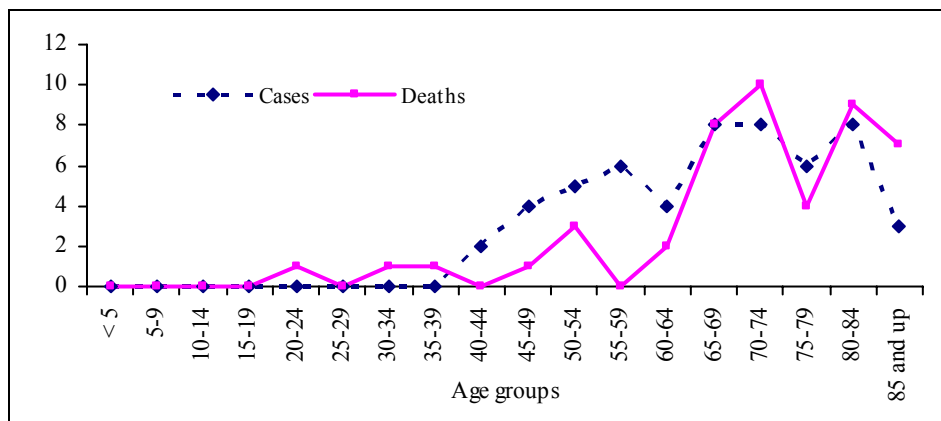
Source: South Dakota Department of Health

Figure 34: Ovary age-specific incidence and mortality rates in South Dakota, 2001
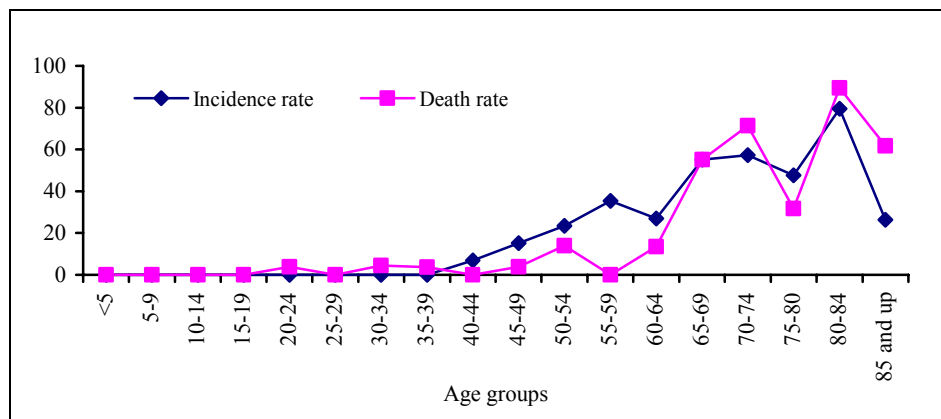
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 32: Ovary age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

|	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	10.0	9.9	3.6	10.1	10.0	10.9
United States *	9.0	9.3	7.2	8.9	9.2	4.9

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

PANCREAS
South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	75	33	42
Number of *in situ* cases	0	0	0
South Dakota incidence$^+$	9.3	9.0	9.4
United States incidence*	10.4	12.0	9.2
Number of deaths	99	48	51
South Dakota mortality$^+$	12.2	13.3 ▲	11.3 ▲
United States mortality*	10.5	12.1	9.3

Rates are per 100,000 persons, age adjusted to the 2000 U.S. standard
  population
▲ Statistical significance higher than national rate
Source: + South Dakota Department of Health
             * *SEER Cancer Statistics Review 1975-2001*

Pancreatic cancer stage at diagnosis
South Dakota, 2001
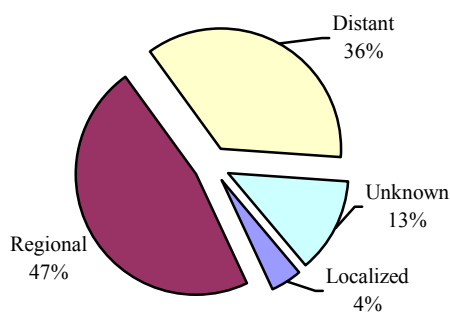
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: In 2001 there were 75 cases of pancreatic cancer accounting for two percent of reported cancer cases. Seventy-four cases were white and one was American Indian. Rates increased with age and pancreatic cancer was rare below 40 years of age. Males had higher rates than females.

Stage at diagnosis: Many cases are diagnosed at regional and distant stages. Approximately a third of the cases reported were at distant stage.

Mortality: Pancreatic cancer was the fourth leading cause of cancer deaths accounting for six percent of cancer deaths. It accounted for 25 percent of deaths due to digestive tract cancers. South Dakota's age-adjusted death rates for 2001 and 1997-2001 were not significantly different from the United States. rate. The five-year trend in death rate changes showed an increase in mortality with an annual percent change (APC) of 2.8 percent. Over the five-year period 1997-2001, the mortality rate for American Indians was slightly higher than that for whites in South Dakota, while nationally rates for whites were much higher than for American Indians. This cancer had a high death to case ratio as many cases were diagnosed at regional and distant stages. There is no Healthy People 2010 objective for this cancer.

Risks and Associated Factors

High dietary fat intake, exposures in industries involving the manufacture of benzene and beta-naphthalene, and metal and leather works are associated with increased risk. Pancreatic cancer is more common in smokers than non-smokers.

Early Detection and Prevention

At present there are no screening tests that can accurately detect early stage pancreatic cancer in asymptomatic individuals. The only chance for cure is surgical resection and only 10 to 25 percent of patients can undergo surgery.

Figure 35: Pancreatic cancer cases and deaths by age in South Dakota, 2001
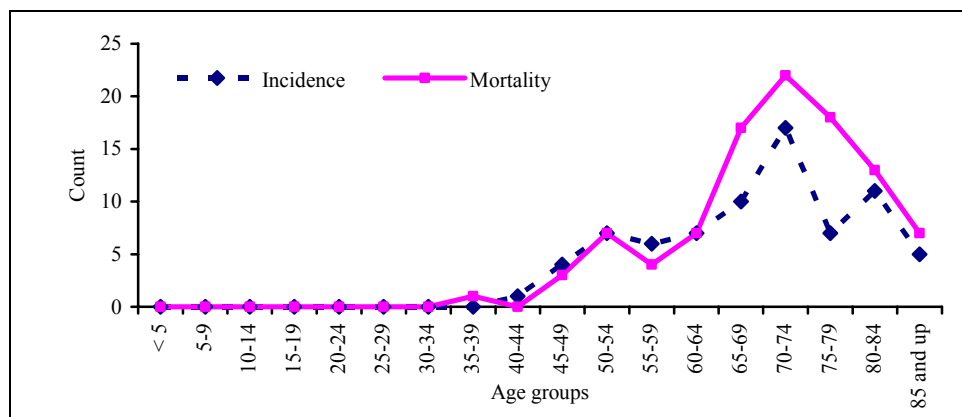
Source: South Dakota Department of Health

Figure 36: Pancreatic cancer age-specific incidence and mortality rates in South Dakota, 2001
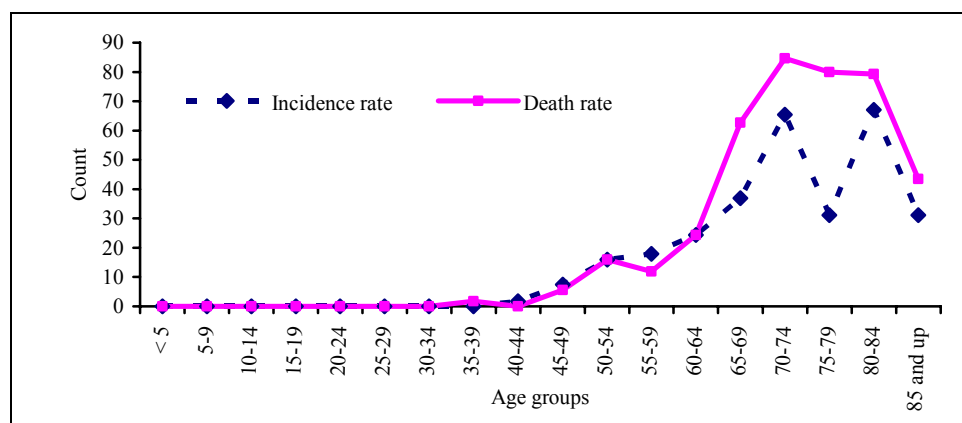
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 33: Pancreatic cancer age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	12.2	12.1	4.4	10.7	10.7	10.4
United States *	10.5	10.4	5.7	10.5	10.4	5.7

Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard million
Source: +South Dakota Department of Health;   * *SEER Cancer Statistics Review 1975-2001*

PROSTATE
South Dakota, 2001

Incidence and Mortality Summary

	Males
Number of invasive cases	670
Number of *in situ* cases	0
South Dakota incidence rate+	185.5
United States incidence rate*	176.8
Number of deaths	115
South Dakota death rate+	33.6
United States death rate*	29.1
Health People 2010 Objective	**28.8**

Rates are per 100,000 persons age adjusted to the 2000
U.S. standard population
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Prostate cancer stage at diagnosis
South Dakota, 2001
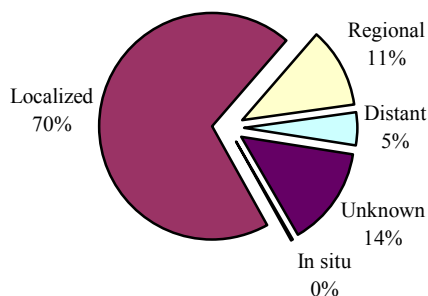
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Prostate cancer is the most common form of cancer diagnosed (other than skin cancer) in males. It is primarily a disease of older men. It was the second leading cancer reported to the SDCR with 670 cases or 19 percent in 2001. Of these, 14 were American Indians. South Dakota should expect increasing incidence as the population ages and as more men get tested.

Stage at Diagnosis: Seventy percent were diagnosed at the localized stage and 11 and five percent at regional and distant stages, respectively.

Mortality: Prostate cancer is the third leading cause of death due to cancer in South Dakota accounting for seven percent of deaths reported. It is the second leading cause of cancer death in males. Of the 110 deaths due to prostate cancer, five were American Indians. Death rates by race showed whites and American Indians with comparable rates. Overall, rates have decreased over the five-year period 1997-2001 with an annual percent change (APC) of -1.5 for all races and -2.0 for whites. The death to case ratio was 0.17 in 2001.

Risks and Associated Factors

Family history has been implicated as increased risk for prostate cancer, but it is unknown whether it is because of genetics or the same exposure. Fat consumption is associated with prostate cancer and occupational exposure such as cadmium may increase risk.

Early Detection and Prevention

Increasing levels of prostate specific antigen in the blood indicate the presence of prostate cancer. However, even with widespread use of this test, prostate cancer mortality has not decreased as the test cannot distinguish between slow growing tumors that are not life threatening and aggressive tumors. The American Cancer Society recommends that men 50 years and older should discuss the risks and benefits of screening with their physician. Digital rectal examinations (DRE) and the prostate specific antigen (PSA) are essential components of diagnosing prostate cancer. There are numerous treatment options including surgery, radiation, hormonal and chemotherapy. Eighty-three percent of prostate cancers are diagnosed in the local and regional stages. It should be noted that the five-year survival rate for patients diagnosed at the local and regional stages is 100 percent.

Figure 37: Prostate cancer cases and deaths by age, South Dakota, 2001
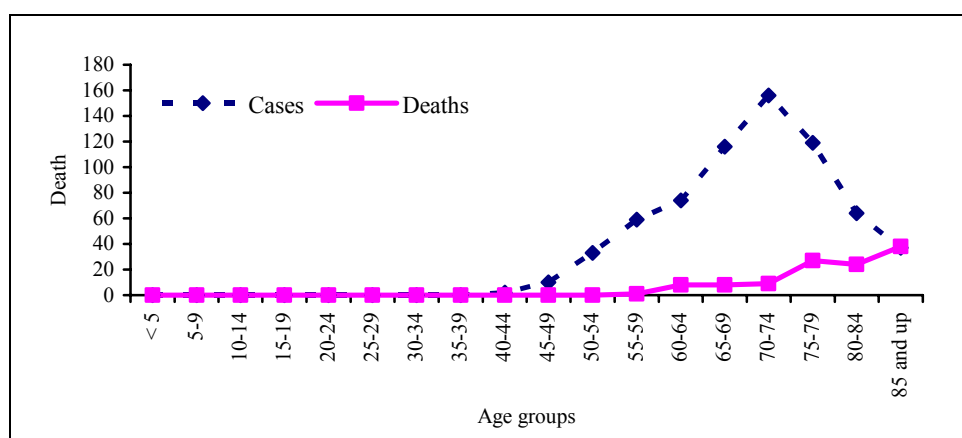
Source: South Dakota Department of Health

Figure 38: Prostate cancer age-specific incidence and mortality rates in South Dakota, 2001
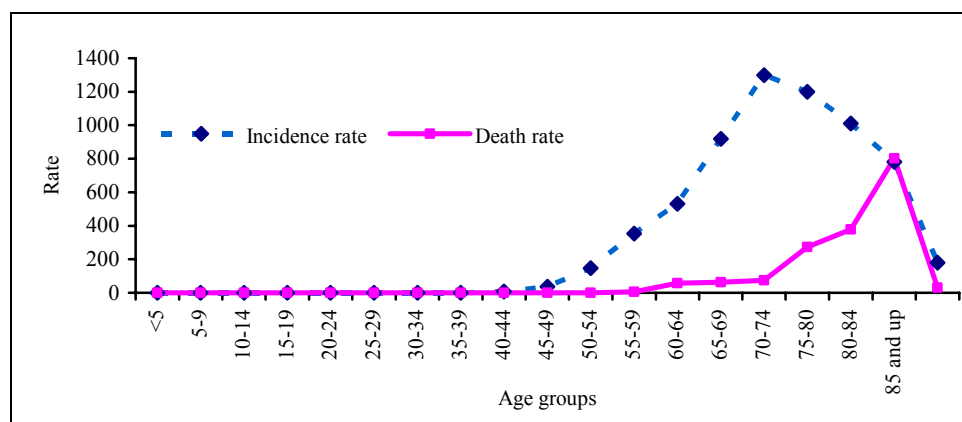
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 34: Prostate age-adjusted death rates by race in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	33.6	33.1	49.6§	31.6	31.7	29.9
United States *	29.1	26.6	19.0	31.5	28.8	20.2

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population. § based on 5 deaths
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

STOMACH
South Dakota, 2001

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	39	26	13
Number of *in situ* cases	0	0	0
South Dakota incidence rate$^+$	5.3	8.	2.8
United States incidence rate*	8.0	11.6	5.3
Number of deaths	29	16	13
South Dakota death rate$^+$	3.4	4.6	2.6
United States death rate*	4.6	6.4	3.2

Rates are per 100,000 persons age-adjusted to the 2000 U.S.
   standard population
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2000*

Stomach cancer stage at diagnosis
South Dakota, 2001

Unknown 19%
Localized 17%
Regional 31%
Distant 33%
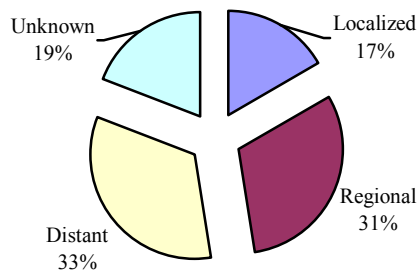
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Stomach cancer accounted for 1.3 percent of cancers reported to the SDCR. Of the 38 cases diagnosed, two were American Indian. Incidence increased with age with more males than females being afflicted.

Stage at diagnosis: Approximately 60 percent of the cases were diagnosed at the regional or distant stage.

Mortality: Stomach cancer accounted for two percent of cancer deaths in 2001 in South Dakota. There was one death among American Indians.

During the period 1997-2001 rates for American Indians were higher than other races but were not significant. Overall the five-year rate showed a decreasing trend with an APC of -8.4 for all races, -7.7 for whites and -8.0 for American Indians. Gastric cancer is presently eighth in cancer deaths in the United States and first in the world. In the 1930's it was also the number one cause of cancer deaths in the United States but decreased in part due to improved methods of food preservation such as refrigeration. It remains high in countries far from the equator.

Risk and Associated Factors

Increased risk has been associated with diets high in smoked foods and foods high in nitrates. Higher rates are found among coal miners and asbestos workers. Cigarette smoking is associated with higher rates and infection with *Helicobacter pylori*, polyps and chronic gastritis can increase risk of disease. Persons who have lived their early years in countries such as Japan, where incidence rates are very high, maintain the same risks after immigrating to the United States. However, their offspring have the same risk as whites in the United States, indicating that exposure to the risk factors could be early in life.

Figure 39: Stomach cancer cases and deaths by age in South Dakota, 2001
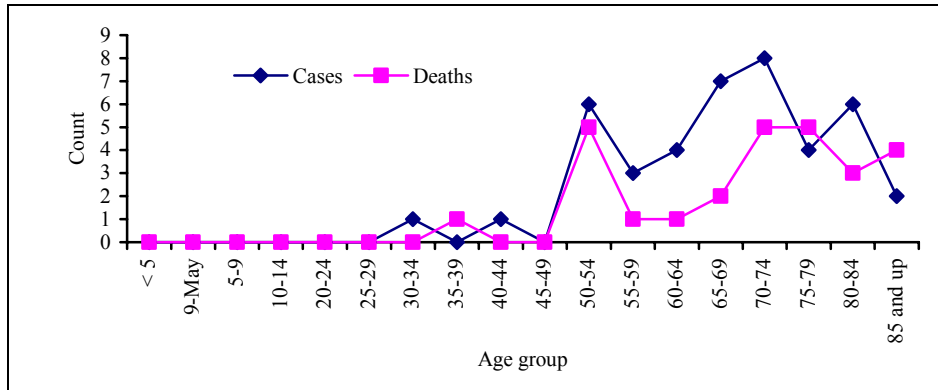
South Dakota Department of Health

Figure 40: Stomach cancer age-specific incidence and mortality rates in South Dakota, 2001
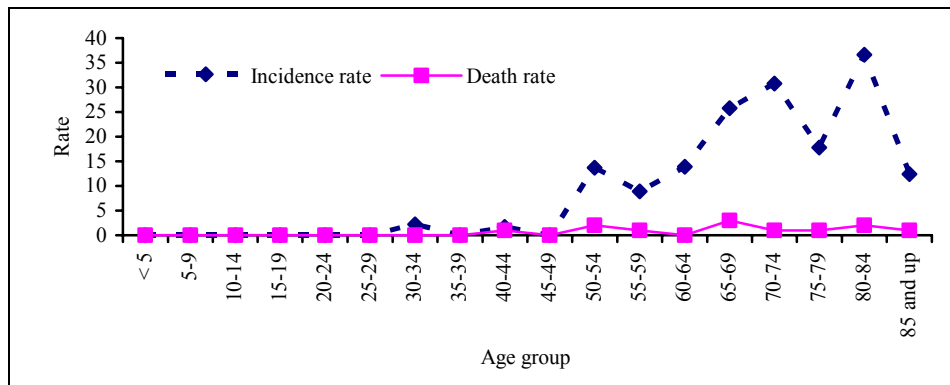
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 35: Stomach age-adjusted incidence and death rates in South Dakota and United States, 2001 and 1997-2001

	2001			1997-2001		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	3.3	3.2	3.1	3.8	3.5	8.4
United States *	4.3	3.8	5.4	4.7	4.1	5.4

Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard population
   Source: +South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2001*

THYROID
South Dakota, 2001

Incidence and Mortality Summary

|	Total	Males	Females
No. of invasive cases	40	12	28
No. of *in situ* cases	0	0	0
South Dakota incidence rate[+]	5.3	3.3	7.3
United States incidence rate*	8.	4.2	11.7
Number of deaths	5	3	2
South Dakota death rate[+]	0.6	0.8	0.4
United States death rate*	0.5	0.6	0.4

Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard population
Source: + South Dakota Department of Health
    SEER Cancer Statistics Review 1975-2001

Thyroid cancer stage at diagnosis
South Dakota, 2001
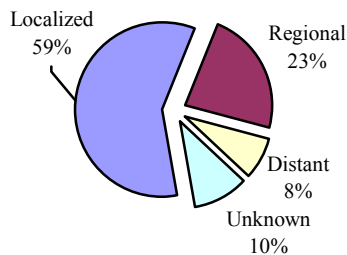
Source: South Dakota Cancer Registry

Descriptive Epidemiology

Incidence: Thyroid cancer was the leading endocrine cancer reported and accounted for one percent of cases reported to the SDCR. Of the 39 cases reported, two were American Indians. Thyroid cancers occurred in people of all ages and occurred more often in men than in women.

Stage at Diagnosis: Almost 60 percent of cases were diagnosed at the localized stage.

Mortality: There were only five deaths due to thyroid cancer during 2001. Death rates were not significantly different from the national rates. Five-year trends for 1997-2001 showed an increase of 6.7 for all races, 31.9 for whites and -8.8 for American Indians. The death to case ratio was 0 .13 in 2001.

Risk and Associated Factors

High levels of radiation, exposure in childhood; family history and not enough iodine in the diet increase risk.

Early Detection and Prevention

Cancer of the thyroid is extremely rare, accounting for less than one percent of all cancers diagnosed. Early detection is an important factor for successful treatment. There are no tests for early detection but people with symptoms should seek prompt attention. Symptoms can include: a lump on the side of the neck, hoarseness of the voice, and difficulty swallowing. Most cancerous thyroid tumors are slow-growing and non- fatal.

Table 36: Thyroid cancer age-adjusted death rates, South Dakota and United States, 2001

	Total	White	American Indian
South Dakota	0.6	0.6	0
United States	0.5	0.5	0.3

Note: Rates are per 100,000 persons, age-adjusted to the 2001 U.S. standard population
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2000

Table 37: Thyroid cancer age-adjusted death rates South Dakota and United States, 1997-2001

	Total	White	American Indian
South Dakota	0.4	0.4	0.7
United States	0.5	0.5	0.3

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

APPENDIX A

2000 United States Standard Million Population

Age Group	Number in Group
All ages	1,000,000
<5	69,135
5-9	72,533
10-14	73,032
15-19	72,169
20-24	66,478
25-29	64,529
30-34	71,044
35-39	80,762
40-44	81,851
45-49	72,118
50-54	62,716
55-59	48,454
60-64	38,793
65-69	34,264
70-74	31,773
75-79	26,999
80-84	17,842
85+	15,508

Appendix B: Race in South Dakota by county, 2001 Census

	Total	White		Black		Native American		Asian		Native Hawaiian		Some Other	
South Dakota	**754844**	**669404**	*89%*	**6201**	*1%*	**68279**	*9%*	**5760**	*1%*	**361**	*0%*	**4839**	*1%*
Aurora	**3058**	**2926**	*96%*	**10**	*0%*	**65**	*2%*	**8**	*0%*	**0**	*0%*	**49**	*2%*
Beadle	**17023**	**16501**	*97%*	**156**	*1%*	**228**	*1%*	**68**	*0%*	**9**	*0%*	**61**	*0%*
Bennett	**3574**	**1462**	*41%*	**11**	*0%*	**2075**	*58%*	**3**	*0%*	**10**	*0%*	**13**	*0%*
BonHomme	**7260**	**6934**	*96%*	**59**	*1%*	**241**	*3%*	**8**	*0%*	**1**	*0%*	**17**	*0%*
Brookings	**28220**	**27194**	*96%*	**119**	*0%*	**343**	*1%*	**433**	*2%*	**11**	*0%*	**120**	*0%*
Brown	**35460**	**33854**	*95%*	**141**	*0%*	**1165**	*3%*	**177**	*0%*	**37**	*0%*	**86**	*0%*
Brule	**5364**	**4823**	*90%*	**17**	*0%*	**486**	*9%*	**33**	*1%*	**2**	*0%*	**3**	*0%*
Buffalo	**2032**	**332**	*16%*	**2**	*0%*	**1692**	*83%*	**0**	*0%*	**0**	*0%*	**6**	*0%*
Butte	**9094**	**8687**	*96%*	**14**	*0%*	**247**	*3%*	**30**	*0%*	**0**	*0%*	**116**	*1%*
Campbell	**1782**	**1770**	*99%*	**0**	*0%*	**11**	*1%*	**1**	*0%*	**0**	*0%*	**0**	*0%*
CharlesMix	**9350**	**6512**	*70%*	**14**	*0%*	**2754**	*29%*	**11**	*0%*	**1**	*0%*	**58**	*1%*
Clark	**4143**	**4087**	*99%*	**5**	*0%*	**31**	*1%*	**8**	*0%*	**2**	*0%*	**10**	*0%*
Clay	**13537**	**12560**	*93%*	**173**	*1%*	**457**	*3%*	**295**	*2%*	**3**	*0%*	**49**	*0%*
Codington	**25897**	**25054**	*97%*	**67**	*0%*	**498**	*2%*	**107**	*0%*	**6**	*0%*	**165**	*1%*
Corson	**4181**	**1555**	*37%*	**4**	*0%*	**2603**	*62%*	**5**	*0%*	**0**	*0%*	**14**	*0%*
Custer	**7275**	**6851**	*94%*	**30**	*0%*	**325**	*4%*	**32**	*0%*	**1**	*0%*	**36**	*0%*
Davison	**18741**	**18034**	*96%*	**80**	*0%*	**445**	*2%*	**101**	*1%*	**10**	*0%*	**71**	*0%*
Day	**6267**	**5719**	*91%*	**11**	*0%*	**514**	*8%*	**5**	*0%*	**3**	*0%*	**15**	*0%*
Deuel	**4498**	**4431**	*99%*	**5**	*0%*	**30**	*1%*	**15**	*0%*	**6**	*0%*	**11**	*0%*
Dewey	**5972**	**1442**	*24%*	**3**	*0%*	**4503**	*75%*	**9**	*0%*	**3**	*0%*	**12**	*0%*
Douglas	**3458**	**3391**	*98%*	**6**	*0%*	**50**	*1%*	**5**	*0%*	**0**	*0%*	**6**	*0%*
Edmunds	**4367**	**4332**	*99%*	**6**	*0%*	**13**	*0%*	**10**	*0%*	**1**	*0%*	**5**	*0%*
Fall River	**7453**	**6746**	*91%*	**29**	*0%*	**606**	*8%*	**26**	*0%*	**8**	*0%*	**38**	*1%*
Faulk	**2640**	**2626**	*99%*	**2**	*0%*	**10**	*0%*	**1**	*0%*	**0**	*0%*	**1**	*0%*
Grant	**7847**	**7738**	*99%*	**2**	*0%*	**47**	*1%*	**25**	*0%*	**0**	*0%*	**35**	*0%*
Gregory	**4792**	**4465**	*93%*	**2**	*0%*	**298**	*6%*	**18**	*0%*	**0**	*0%*	**9**	*0%*
Haakon	**2196**	**2117**	*96%*	**0**	*0%*	**74**	*3%*	**4**	*0%*	**0**	*0%*	**1**	*0%*
Hamlin	**5540**	**5456**	*98%*	**9**	*0%*	**49**	*1%*	**17**	*0%*	**1**	*0%*	**8**	*0%*
Hand	**3741**	**3715**	*99%*	**2**	*0%*	**11**	*0%*	**8**	*0%*	**0**	*0%*	**5**	*0%*
Hanson	**3139**	**3124**	*####*	**0**	*0%*	**5**	*0%*	**8**	*0%*	**1**	*0%*	**1**	*0%*
Harding	**1353**	**1321**	*98%*	**4**	*0%*	**15**	*1%*	**8**	*1%*	**0**	*0%*	**5**	*0%*
Hughes	**16481**	**14654**	*89%*	**38**	*0%*	**1631**	*10%*	**85**	*1%*	**4**	*0%*	**69**	*0%*
Hutchinson	**8075**	**7980**	*99%*	**14**	*0%*	**64**	*1%*	**9**	*0%*	**0**	*0%*	**8**	*0%*
Hyde	**1671**	**1522**	*91%*	**4**	*0%*	**141**	*8%*	**0**	*0%*	**2**	*0%*	**2**	*0%*
Jackson	**2930**	**1467**	*50%*	**1**	*0%*	**1453**	*50%*	**4**	*0%*	**1**	*0%*	**4**	*0%*
Jerauld	**2295**	**2272**	*99%*	**2**	*0%*	**18**	*1%*	**3**	*0%*	**0**	*0%*	**0**	*0%*
Jones	**1193**	**1143**	*96%*	**0**	*0%*	**47**	*4%*	**0**	*0%*	**1**	*0%*	**2**	*0%*
Kingsbury	**5815**	**5730**	*99%*	**8**	*0%*	**33**	*1%*	**31**	*1%*	**0**	*0%*	**13**	*0%*
Lake	**11276**	**11023**	*98%*	**35**	*0%*	**99**	*1%*	**67**	*1%*	**1**	*0%*	**51**	*0%*
Lawrence	**21802**	**20884**	*96%*	**71**	*0%*	**629**	*3%*	**104**	*0%*	**14**	*0%*	**100**	*0%*
Lincoln	**24131**	**23539**	*98%*	**133**	*1%*	**204**	*1%*	**156**	*1%*	**9**	*0%*	**90**	*0%*
Lyman	**3895**	**2522**	*65%*	**3**	*0%*	**1351**	*35%*	**14**	*0%*	**0**	*0%*	**5**	*0%*
Marshall	**5832**	**5766**	*99%*	**5**	*0%*	**36**	*1%*	**15**	*0%*	**0**	*0%*	**10**	*0%*
McCook	**2904**	**2885**	*99%*	**0**	*0%*	**12**	*0%*	**5**	*0%*	**0**	*0%*	**2**	*0%*
McPherson	**4576**	**4237**	*93%*	**8**	*0%*	**312**	*7%*	**5**	*0%*	**3**	*0%*	**11**	*0%*
Meade	**24253**	**22471**	*93%*	**444**	*2%*	**829**	*3%*	**286**	*1%*	**19**	*0%*	**204**	*1%*
Mellette	**2083**	**932**	*45%*	**0**	*0%*	**1143**	*55%*	**2**	*0%*	**0**	*0%*	**6**	*0%*
Miner	**2884**	**2848**	*99%*	**18**	*1%*	**11**	*0%*	**4**	*0%*	**0**	*0%*	**3**	*0%*
Minnehaha	**148281**	**137941**	*93%*	**2916**	*2%*	**3457**	*2%*	**1895**	*1%*	**93**	*0%*	**1979**	*1%*
Moody	**6595**	**5600**	*85%*	**28**	*0%*	**909**	*14%*	**46**	*1%*	**1**	*0%*	**11**	*0%*
Pennington	**88565**	**76789**	*87%*	**1028**	*1%*	**8735**	*10%*	**1080**	*1%*	**72**	*0%*	**861**	*1%*
Perkins	**3363**	**3250**	*97%*	**9**	*0%*	**73**	*2%*	**9**	*0%*	**0**	*0%*	**22**	*1%*
Potter	**2693**	**2643**	*98%*	**0**	*0%*	**33**	*1%*	**13**	*0%*	**1**	*0%*	**3**	*0%*
Roberts	**10016**	**6840**	*68%*	**17**	*0%*	**3121**	*31%*	**33**	*0%*	**0**	*0%*	**5**	*0%*
Sanborn	**2675**	**2645**	*99%*	**3**	*0%*	**10**	*0%*	**13**	*0%*	**1**	*0%*	**3**	*0%*
Shannon	**12466**	**562**	*5%*	**10**	*0%*	**11850**	*95%*	**4**	*0%*	**6**	*0%*	**34**	*0%*
Spink	**7454**	**7272**	*98%*	**20**	*0%*	**133**	*2%*	**15**	*0%*	**1**	*0%*	**13**	*0%*
Stanley	**2772**	**2579**	*93%*	**8**	*0%*	**172**	*6%*	**9**	*0%*	**0**	*0%*	**4**	*0%*
Sully	**1556**	**1522**	*98%*	**3**	*0%*	**20**	*1%*	**5**	*0%*	**0**	*0%*	**6**	*0%*
Todd	**9050**	**1138**	*13%*	**8**	*0%*	**7861**	*87%*	**18**	*0%*	**0**	*0%*	**25**	*0%*
Tripp	**6430**	**5625**	*87%*	**10**	*0%*	**782**	*12%*	**7**	*0%*	**0**	*0%*	**6**	*0%*
Turner	**8849**	**8748**	*99%*	**23**	*0%*	**43**	*0%*	**24**	*0%*	**0**	*0%*	**11**	*0%*
Union	**12584**	**12187**	*97%*	**55**	*0%*	**87**	*1%*	**191**	*2%*	**7**	*0%*	**57**	*0%*
Walworth	**5974**	**5172**	*87%*	**7**	*0%*	**776**	*13%*	**11**	*0%*	**2**	*0%*	**6**	*0%*
Yankton	**21652**	**20592**	*95%*	**289**	*1%*	**469**	*2%*	**116**	*1%*	**7**	*0%*	**179**	*1%*
Ziebach	**2519**	**665**	*26%*	**0**	*0%*	**1844**	*73%*	**2**	*0%*	**0**	*0%*	**8**	*0%*

*Multiple race categories collapsed into most common minority status.
Source: United States Census Bureau 2000

Appendix C: American Indian population by age group and county, 2000 Census

Age group	0-19	20-29	30-39	40-49	50+	Total
South Dakota	**33,483**	**9,868**	**8,939**	**7,185**	**8,806**	**68,279**
Aurora	57	2	1	1	4	65
Beadle	104	34	42	23	25	228
Bennett	1,046	296	268	203	262	2,075
Bon Homme	87	65	42	31	16	241
Brookings	167	67	52	30	27	343
Brown	540	197	167	114	147	1,165
Brule	339	36	39	27	45	486
Buffalo	832	223	211	184	242	1,692
Butte	115	30	40	28	34	247
Campbell	5	1	1	1	3	11
Charles Mix	1,379	398	301	304	372	2,754
Clark	22	-	5	3	1	31
Clay	213	107	57	31	49	457
Codington	236	86	74	66	36	498
Corson	1,285	369	353	256	340	2,603
Custer	170	33	19	46	58	325
Davison	241	77	58	40	30	445
Day	254	61	58	57	84	514
Deuel	12	5	2	6	5	30
Dewey	2,170	592	621	489	631	4,503
Douglas	30	2	5	8	5	50
Edmunds	7	-	1	1	4	13
Fall River	247	73	59	74	153	606
Faulk	4	-	1	3	2	10
Grant	24	6	5	8	4	47
Gregory	130	38	43	37	50	298
Haakon	41	10	13	5	5	74
Hamlin	19	11	6	5	8	49
Hand	3	-	4	-	4	11
Hanson	1	2	2	-	-	5
Harding	6	-	2	2	5	15
Hughes	851	241	220	152	167	1,631
Hutchinson	44	7	4	3	6	64
Hyde	57	26	21	18	19	141
Jackson	750	183	182	140	198	1,453
Jerauld	8	3	1	2	4	18
Jones	19	8	6	5	9	47
Kingsbury	12	3	6	5	7	33
Lake	49	10	22	12	6	99
Lawrence	298	108	62	67	94	629
Lincoln	110	25	25	27	17	204
Lyman	689	200	165	144	153	1,351
McCook	5	4	-	1	2	12
McPherson	142	32	42	31	65	312
Marshall	14	4	8	6	4	36
Meade	380	112	90	112	135	829
Mellette	565	126	150	122	180	1,143
Miner	4	-	1	3	3	11
Minnehaha	1,536	674	608	376	263	3,457
Moody	421	126	139	99	124	909
Pennington	4,057	1,402	1,201	966	1,109	8,735
Perkins	37	6	11	5	14	73
Potter	12	2	6	3	10	33
Roberts	1,521	420	395	321	464	3,121
Sanborn	5	1	2	-	2	10
Shannon	5,969	1,618	1,524	1,195	1,544	11,850
Spink	46	30	31	16	10	133
Stanley	89	14	24	22	23	172
Sully	10	2	2	3	3	20
Todd	4,016	1,099	946	818	982	7,861
Tripp	419	85	104	70	104	782
Turner	21	5	5	7	5	43
Union	41	9	13	12	12	87
Walworth	365	129	96	68	118	776
Yankton	170	83	70	71	75	469
Ziebach	965	250	205	200	224	1,844

Source: United States Census Bureau, 2001

Appendix D: SEER Incidence Site Analysis Categories

Site Group	ICD-O-2 Site excludes histological type 9590-9989
Oral Cavity and Pharynx	
Lip	C000-C009
Tongue	C019-C029
Salivary Gland	C079-C089
Floor of Mouth	C040-C049
Gum and Other Mouth	C030-C039, C050-C059, C060-C069
Nasopharynx	C110-C119
Tonsil	C090-C099
Oropharynx	C100-C109
Hypopharynx	C129, C130-C139
Other Oral Cavity and Pharynx	C140, C142-C148
Digestive System	
Esophagus	C150-C159
Stomach	C160-C169
Small Intestine	C170-C179
Colon and Rectum	
Colon excluding Rectum	
Cecum	C180
Appendix	C181
Ascending Colon	C182
Hepatic Flexure	C183
Transverse Colon	C184
Splenic Flexure	C185
Descending Colon	C186
Sigmoid Colon	C187
Large Intestine, NOS	C188-C189, C260
Rectum and Rectosigmoid Junction	
Rectosigmoid Junction	C199
Rectum	C209
Anus, Anal Canal and Anorectum	C210-C212, C218
Liver and Intrahepatic Bile Duct	
Liver	C220
Intrahepatic Bile Duct	C221
Gallbladder	C239
Other Biliary	C240-C249
Pancreas	C250-C259
Retroperitoneum	C480
Peritoneum, Omentum and Mesentery	C481-C482
Other Digestive Organs	C268-C269, C488
Respiratory System	
Nose, Nasal Cavity and Middle Ear	C300-C301, C310-C319
Larynx	C320-C329
Lung and Bronchus	C340-C349
Pleura	C384
Trachea, Mediastinum and Other Respiratory Organs	C339, C381-C383, C388, C390, C398, C399
Bones and Joints	C400-C419
Soft Tissue including Heart	C380, C470-C479, C490-C499
Skin excluding Basal and Squamous	
Melanoma of the Skin	C440-C449
Other Non-Epithelial Skin	C440-C449
Breast	C500-C509

Source: http://seer.cancer.gov/siterecode

Appendix D: SEER Incidence Site Analysis Categories (cont'd)	
Female Genital System	
Cervix Uteri	C530-C539
Corpus and Uterus, NOS	
Corpus Uteri	C540-C549
Uterus, NOS	C559
Ovary	C569
Vagina	C529
Vulva	C510-C519
Other Female Genital Organs	C570-C589
Male Genital System	
Prostate	C619
Testis	C620-C629
Penis	C600-C609
Other Male Genital Organs	C630-C639
Urinary System	
Bladder	C670-C679
Kidney and Renal Pelvis	C649, C659
Ureter	C669
Other Urinary Organs	C680-C689
Eye and Orbit	C690-C699
Brain and Other Nervous System	
Brain	C710-C719
Cranial Nerves Other Nervous System	C710-C719
	C700-C709, C720-C729
Endocrine System	
Thyroid	C739
Other Endocrine including Thymus	C379, C740-C749, C750-C759
Lymphoma	
Hodgkin Lymphoma	
Hodgkin - Nodal	C024, C098-C099, C111, C142, C379, C422, C770-C779
Hodgkin - Extranodal	All other sites
Non-Hodgkin Lymphoma	
NHL - Nodal	C024, C098-C099, C111, C142, C379, C422, C770-C779
NHL - Extranodal	All sites except C024, C098-C099, C111, C142, C379, C422, C770-C779
	All sites except C024, C098-C099, C111, C142, C379, C420-C422, C424, C770-C779
Myeloma	
Leukemia	
Lymphocytic Leukemia	
Acute Lymphocytic Leukemia	
Chronic Lymphocytic Leukemia	C420, C421, C424
Other Lymphocytic Leukemia	
Myeloid and Monocytic Leukemia	
Acute Myeloid Leukemia	
Acute Monocytic Leukemia	
Chronic Myeloid Leukemia	
Other Myeloid/Monocytic Leukemia	
Other Leukemia	
Other Acute Leukemia	
Aleukemic, Subleukemic and NOS	
	C420, C421, C424
	C760-C768, C809
	C420-C424
	C770-C779

Appendix E: SEER Cancer Cause of Death Analysis Categories

Cancer Causes of Death	ICD-10
All Malignant Cancers	C00-C97
Oral Cavity and Pharynx	
Lip	C00
Tongue	C01-C02
Salivary Gland	C07-C08
Floor of Mouth	C04
Gum and Other Mouth	C03, C05-C06
Nasopharynx	C11
Tonsil	C09
Oropharynx	C10
Hypopharynx	C12-C13
Other Oral Cavity and Pharynx	C14
Digestive System	
Esophagus	C15
Stomach	C16
Small Intestine	C17
Colon and Rectum	
Colon excluding Rectum	C18, C26.0
Rectum and Rectosigmoid Junction	C19-C20
Anus, Anal Canal and Anorectum	C21
Liver and Intrahepatic Bile Duct	
Liver	C22.0, C22.2-C22.4, C22.7, C22.9
Intrahepatic Bile Duct	C22.1
Gallbladder	C23
Other Biliary	C24
Pancreas	C25
Retroperitoneum	C48.0
Peritoneum, Omentum and Mesentery	C45.1+, C48.1-C48.2
Other Digestive Organs	C26.8-C26.9, C48.8
Respiratory System	
Nose, Nasal Cavity and Middle Ear	C30-C31
Larynx	C32
Lung and Bronchus	C34
Pleura	C38.4, C45.0+
Trachea, Mediastinum and Other Respiratory Organs	C33, C38.1-C38.3, C38.8, C39
Bones and Joints	C40-C41
Soft Tissue including Heart	C47, C49, C38.0, C45.2+
Skin excluding Basal and Squamous	
Melanoma of the Skin	C43
Other Non-Epithelial Skin	C44, C46+
Breast	C50
Female Genital System	
Cervix Uteri	C53
Corpus and Uterus, NOS	
Corpus Uteri	C54
Uterus, NOS	C55
Ovary	C56
Vagina	C52
Vulva	C51
Other Female Genital Organs	C57-C58

Male Genital System	
Prostate	C61
Testis	C62
Penis	C60
Other Male Genital Organs	C63
Urinary System	
Bladder	C67
Kidney and Renal Pelvis	C64-C65
Ureter	C66
Other Urinary Organs	C68
Eye and Orbit	C69
Brain and Other Nervous System	C70, C71, C72
Endocrine System	
Thyroid	C73
Other Endocrine including Thymus	C37, C74-C75
Lymphoma	
Hodgkin Lymphoma	C81
Non-Hodgkin Lymphoma	C82-C85, C96.3
Myeloma	C90.0, C90.2
Leukemia	
Lymphocytic Leukemia	
Acute Lymphocytic Leukemia	C91.0
Chronic Lymphocytic Leukemia	C91.1
Other Lymphocytic Leukemia	C91.2-C91.4, C91.7, C91.9
Myeloid and Monocytic Leukemia	
Acute Myeloid	C92.0, C92.4-C92.5, C94.0, C94.2
Acute Monocytic Leukemia	C93.0
Chronic Myeloid Leukemia	C92.1
Other Myeloid/Monocytic Leukemia	C92.2-C92.3, C92.7, C92.9, C93.1-C93.2, C93.7, C93.9
Other Acute Leukemia	C94.4, C94.5, C95.0
Aleukemic, Subleukemic and NOS	C90.1, C91.5, C94.1, C94.3, C94.7, C95.1, C95.2, C95.7, C95.9
Mesothelioma (ICD-10 only)+	C45+
Kaposi Sarcoma (ICD-10 only)+	C46+
Miscellaneous Malignant Cancer	C26.1, C45.7+, C45.9+, C76-C80, C88, C96.0-C96.2, C96.7,

Source: http://seer.cancer.gov/codrecode

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